VOLUME L NUMBER SIX

The NATIONAL GEOGRAPHIC MAGAZINE

DECEMBER, 1926

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TO carry out the purposes for which it was founded thirty-eight years ago, the National Geographic Society publishes this Magazine. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings and whose customs, ceremonies, and name have been engulfed in an oblivion.

TO further the important study of solar radiation in relation to long-range weather forecasting, The Society has appropriated $60,000 to enable Dr. Charles G. Abbot, of the Smithsonian Institution, to establish a station for four years on Mt. Brukkaros, in Southwest Africa.

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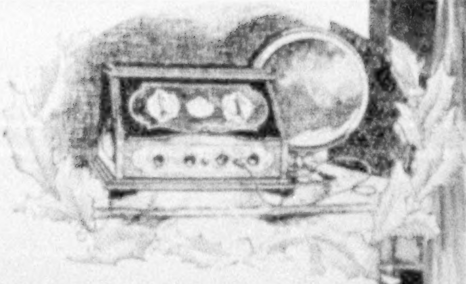

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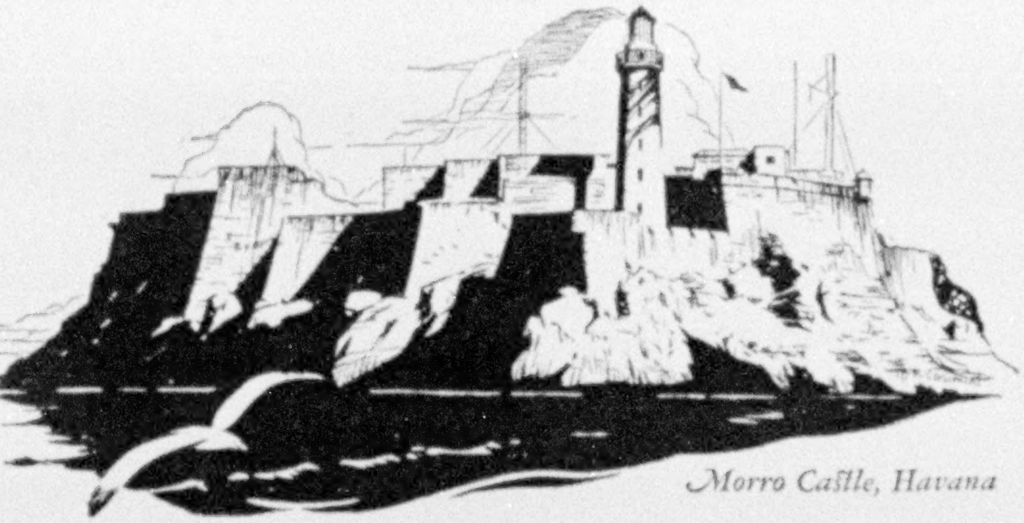

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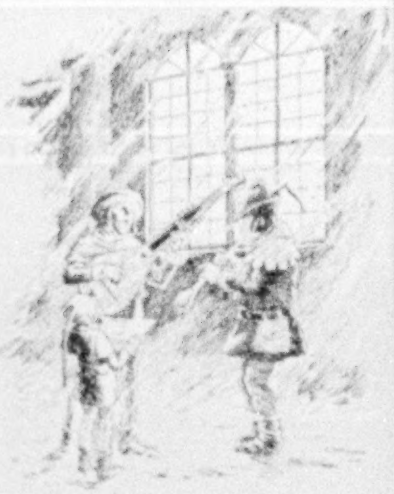

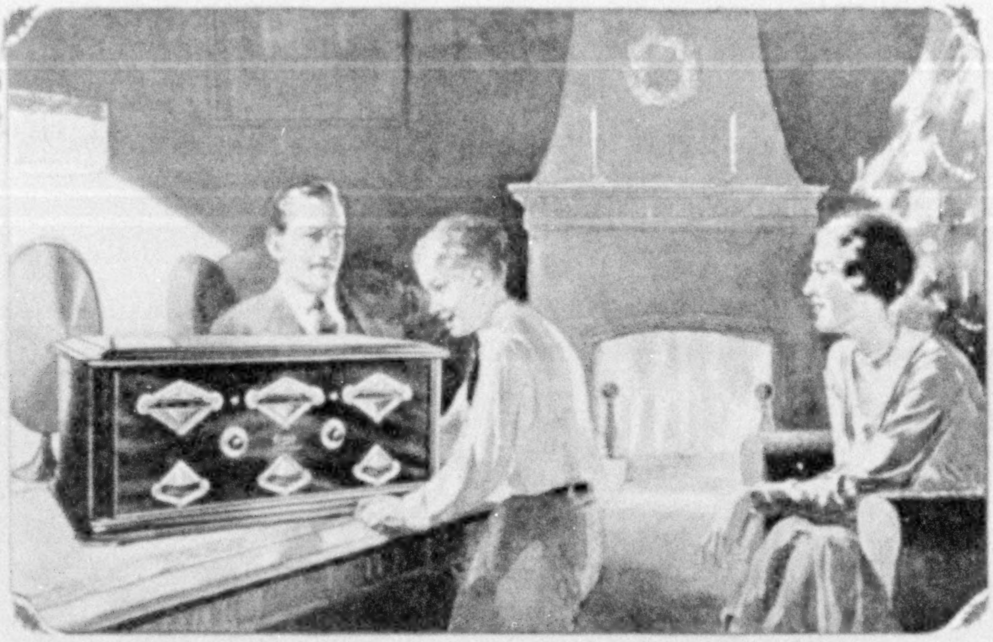

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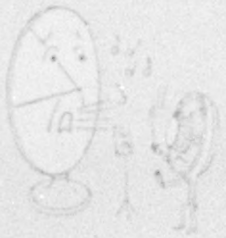

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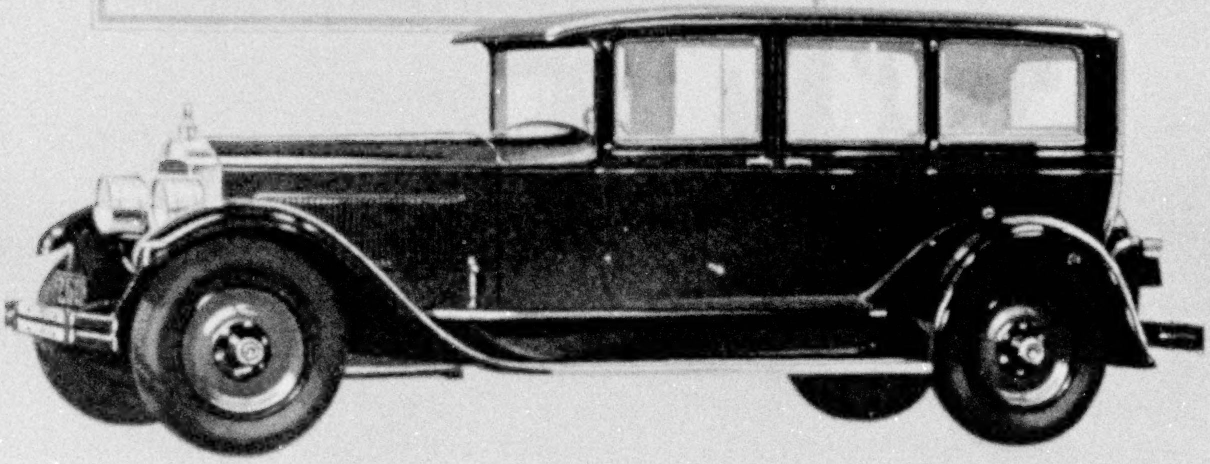

A S K   T H E   M A N   W H O   O W N S   O N E

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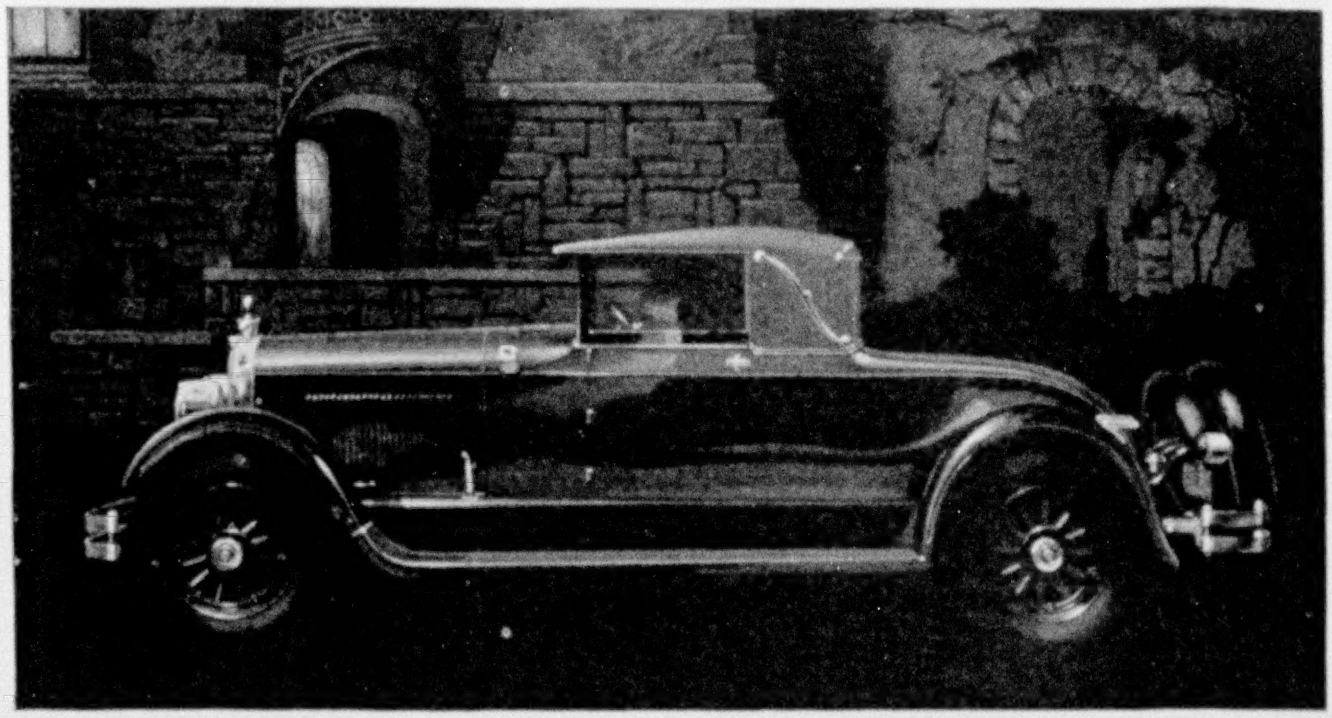

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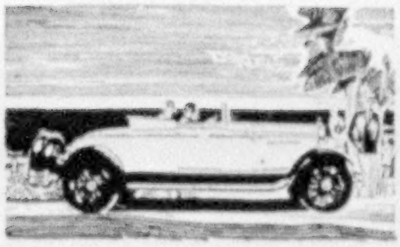

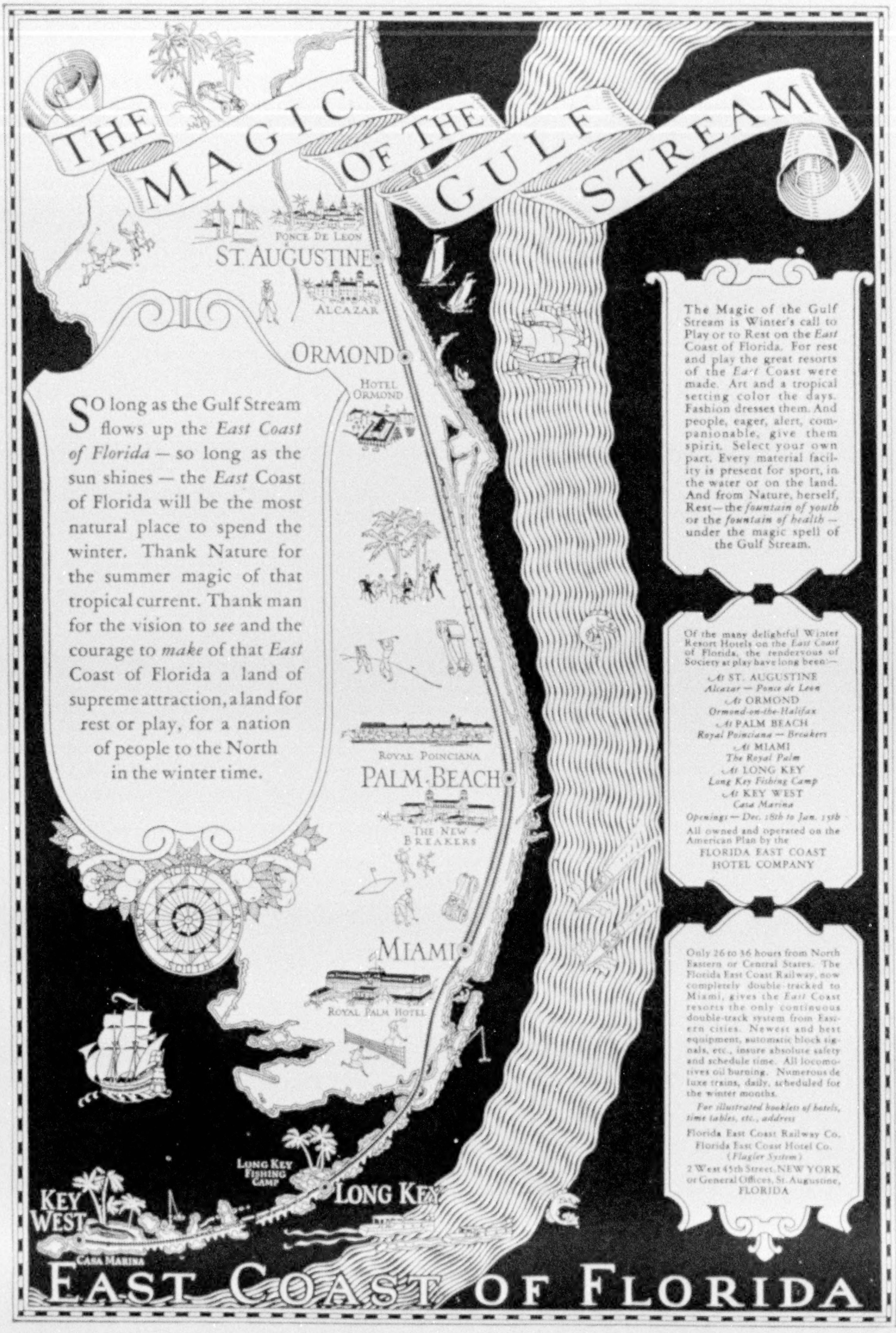
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ST. AUGUSTINE
ALCAZAR
ORMOND
HOTEL ORMOND
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PALM BEACH
THE NEW BREAKERS
NORTH
SOUTH
MIAMI
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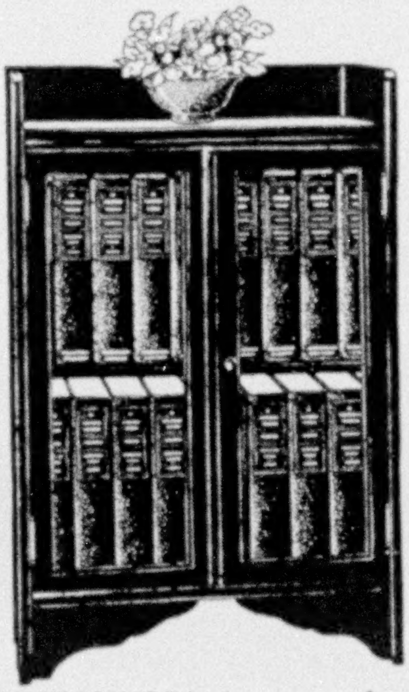

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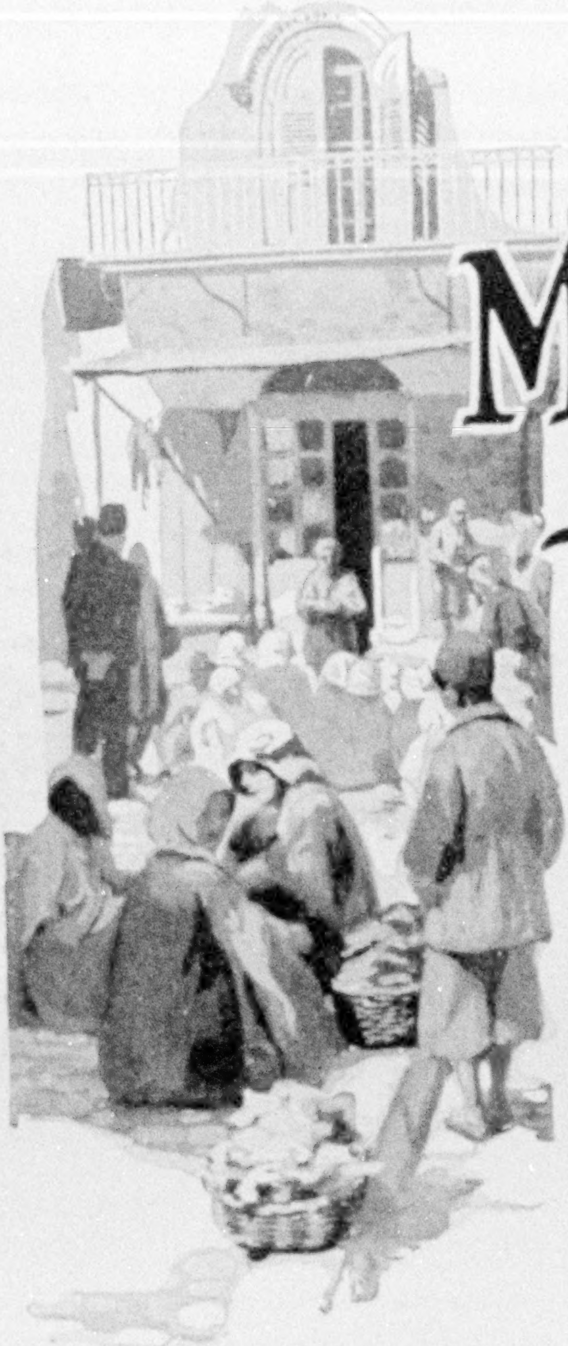

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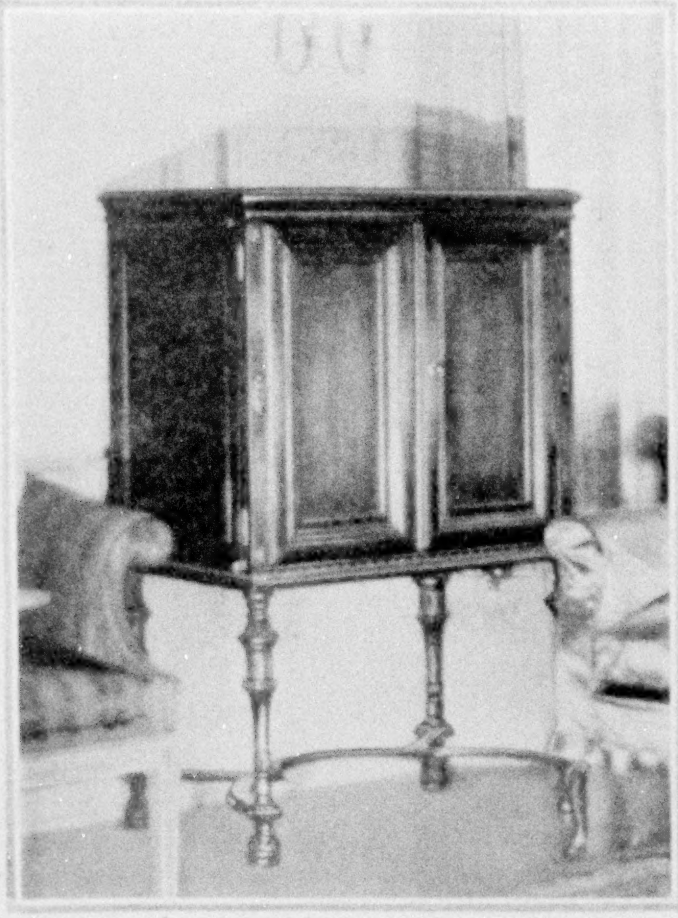

The Brunswick Panatrope & Radiola. Panatrope combined with either 6- or 8-tube Radiola Super-heterodyne. Finished in walnut. Prices range from $350 to $1250. (Slightly higher west of Rockies)

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Brunswick dealers will gladly demonstrate these instruments. If there is no Brunswick store near you, write us.

**$5,000 for a name*

To find a suitable name for the new Brunswick instrument we offer three prizes totaling $5,000 (1st prize, $3,000; 2d prize, $1,500; 3d prize, $500) for the best name submitted together with an advertising slogan not exceeding 10 words describing its music. Contest closes Dec. 15 at midnight. In event of a tie for any prize offered, a prize identical in all respects with that tied for will be awarded each tying contestant. Write for free booklet giving all details. Address Dept. P-197.

Brunswick

PANATROPES RADIOLAS RECORDS

Brunswick Records by the new "Light-Ray" electrical method (music by photography) are now on sale every Thursday

THE BRUNSWICK-BALKE-COLLENDER CO. General Offices: 623 S. WABASH AVE., CHICAGO

SUNSET LIMITED *to* California

BITS of old Spain along our Southern border add a charming interest to your journey West via the "Open Window Route". Balmy climate, attractive stop-overs, rock-ballasted road bed, oil-burning locomotives. A delightful revelation in superb travel comfort.

Sunshine all the Way!

The Sunset Limited is a de luxe daily train without extra fare New Orleans to Los Angeles, San Diego, and San Francisco. Stopover privileges at New Orleans, Houston, San Antonio, El Paso, Tucson and other fascinating resort cities.

Club Car, Observation Car and latest type Dining and Sleeping Cars. Convenient service for the 120-mile motor side trip over the famous Apache Trail and for the marvelous Carriso Gorge.

Sunset Route

For further information and descriptive booklets address:

New York 165 Broadway	*Chicago* 33 W. Jackson Boulevard	*New Orleans* Pan. Am. Bank Bldg.
Los Angeles Pacific Electric Bldg.	*Houston* Southern Pacific Bldg.	*San Francisco* Southern Pacific Bldg.

SOUTHERN PACIFIC LINES

SOUTHERN PACIFIC LINES

CALIFORNIA

Must your children play indoors all winter?

IN CALIFORNIA, windows open on rose gardens fragrant at Christmastime. Acacia trees sprinkle their golden blossoms on playgrounds and lawns kept green in winter by showers that drift in from the warm Pacific.

Think! If you had lived in San Francisco for the last 15 years, the thermometer in your garden would have averaged only 10 *degrees* cooler at noontime on 15 Christmas Days than on 15 Fourth of July *noons!* And in the surrounding suburban cities you may discover even warmer winter temperatures.

That is one reason why, here in California, our children escape those anxious ills that go with chill, bleak winter weather. Their chest measurement is greater for it; United States Government health statistics show they're taller, stronger. Year after year they win and hold national and international athletic championships.

Other Millions Have Answered Your Question

Granted—you say—I'd like to see my boy mowing a green lawn in winter. I'd rather my girl were playing tennis in December on a geranium-bordered court. But my home, my farm, or my business—ties me down.

Farms? Here are long leagues of cultivated, fruitful land at practical farmers' prices—with soil, climate and water that bring California a $500,000,000 crop each year. *Business?* Here are 4,000,000 people like yourself—the best consumers in America—to be fed, clothed, sheltered, entertained and served. *Homes?* For just as little as you would pay for houses and lots in the same size city or town anywhere (and often for less) you can have a home of your own in California. The same moderate capital that you would need elsewhere will serve you amply here. Homes can be bought on initial payments of as low as $1,000.

Why Opportunities Are Wider

Four million Californians, with bank accounts twice the national average size, with 104 automobiles per hundred families, with more electrical conveniences and telephones, with finer schools and better homes—these four million people live so much better simply *because opportunity in California is greater, richer and more productive for the average man with an average stake.*

San Francisco

San Francisco, the gateway to Hawaii and the Orient, is one of the busiest ports of the seven seas, supplying to the nations of the world California's abundant products and manufactures.

Come to San Francisco

Thousands of people are locating in San Francisco—to live near the sea, to educate their children in the excellent public schools or nearby universities, to take advantage of the many fine manufacturing opportunities or because they find contented employment, and together with their employers, are working out the destiny of this splendid city.

Is there not here a better place for you?

Send for "California—Where Life is Better"

Californians Inc. has no land or service to sell. It is a non-profit organization interested in the sound development of the state, supported by thousands of public-spirited contributions and furnishing authoritative information and helpful service to any man or woman, any business man or farmer, who asks for it. Californians Inc. service starts with a 48-page illustrated book—"California—Where Life is Better." Send for it—read it now!

MAIL *this coupon for* FREE BOOKLET *about life in California*

Californians Inc.

Headquarters 114-1

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Please send me "California, Where Life is Better"

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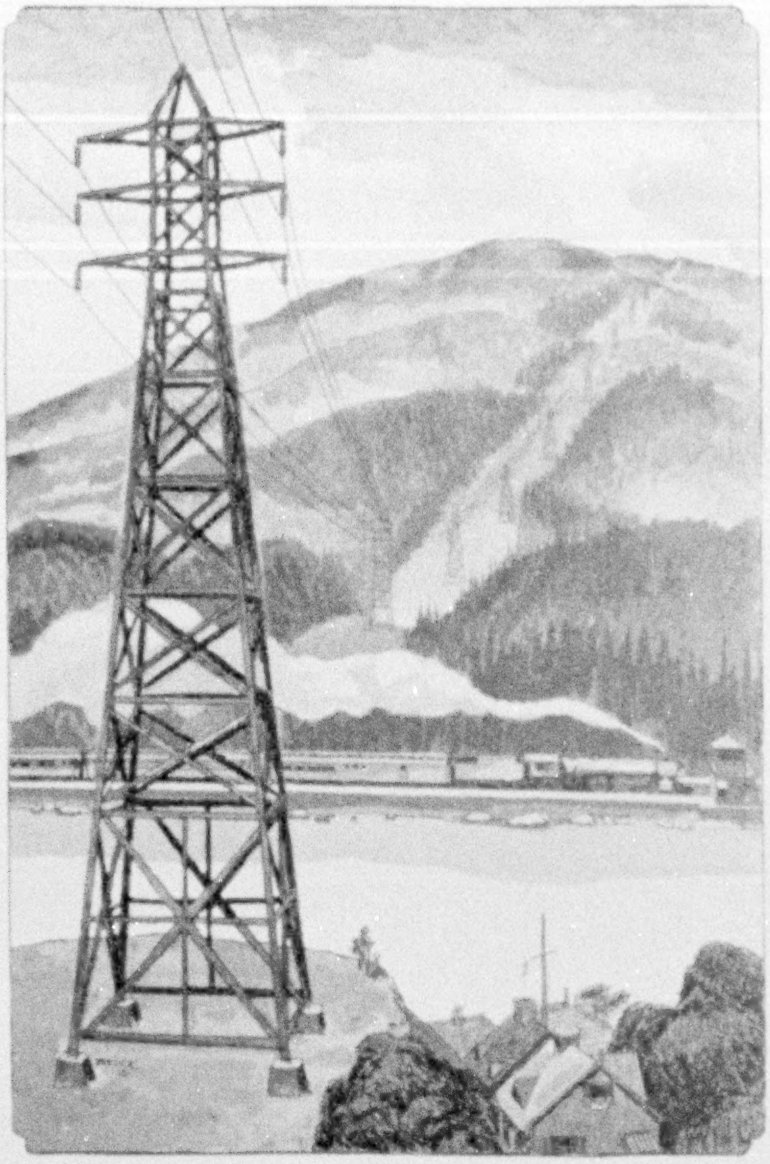

The Development Service of Southern Railway System, Washington, D.C., will gladly aid in securing industrial locations, farms and home sites in the South.

Towers of Southern Industry

GREAT towers of slender steel march Indian file up over wooded hills and down through valley fields, carrying power and light to the farms, homes and factories of the South.

The rapid increase in the production of electricity in the South, from water and steam power, is an outstanding industrial achievement of our time. It has risen more than 375% since 1912—in the rest of the country about 275%.

Cheap and abundant electricity is a magnet to modern industry. It effects economies and makes for better industrial methods.

This is one of many advantages that are making the South a national manufacturing center—that already have made the South the textile center of America.

Railroad transportation has always been one of the cheapest things the American people buy. The charge on the Southern Railway System for hauling a car of 30 tons of freight one mile averages only 35¢.

SOUTHERN

RAILWAY SYSTEM

THE SOUTHERN SERVES THE SOUTH

No other gift can give such satisfaction

COULD any woman have a more wonderful Christmas? A beautiful new metal cabinet Frigidaire, with its lustrous white Duco finish and its spotless porcelain enamel lining—a gift that will prove an everyday convenience for years to come.

There are more than 250,000 Frigidaires in use—more than all other electric refrigerators combined. And any Frigidaire user will tell you of Frigidaire's unvarying dependability and economy, and of the unequaled service rendered by the nation-wide Frigidaire organization.

The nearest Frigidaire representative will be glad to show you the new metal cabinet models and the Frigidaire units designed for installation in the standard makes of ice-boxes. New low prices and the General Motors deferred payment plan make Frigidaire very easy to buy.

"This modern 'ice man" calls once—with Frigidaire—and the ice stays always

Frigidaire

PRODUCT of GENERAL MOTORS

Be Sure it is a Frigidaire—Product of General Motors

FRIGIDAIRE CORPORATION
Dept. Y-38, Dayton, Ohio
Please send me a copy of the Frigidaire Catalog.

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Address ....

City .... State ....

Revel in the SUNSHINE on the GULF COAST

Say good-by to winter and hello to spring—leave Jack Frost behind and enjoy the cold months in this land of glorious outdoor life. Splendid hotels and sights of historic, romantic and modern interest to the winter visitor. Come down to play and you may decide to stay, for the growth of the Gulf Coast section is substantial and permanent. New homes, new business houses, new industries and new opportunities are developing all the way from West Florida to New Orleans. Reach this "Riviera of America" on fine, fast trains—from the North

The Pan-American

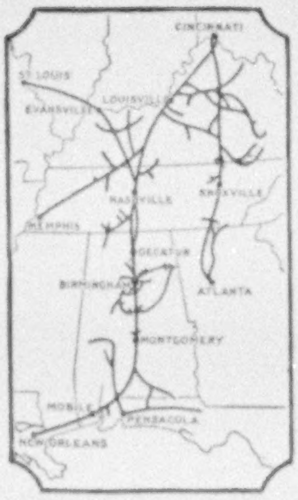
ALL-PULLMAN

one of the world's finest trains. Through from Cincinnati and Louisville to Pensacola, Mobile and New Orleans with the famous L. & N. dining-car service all the way. Club car for men with shower and valet service; observation car with library, radio and ladies' lounge room, shower bath and maid service. Other splendid through service from Cincinnati, Chicago, St. Louis and Evansville via the L. & N. direct to the Gulf Coast. Reached from the East by the crack, all-Pullman train—

CRESCENT LIMITED

Similar in equipment to that of The Pan-American. Direct from New York, Philadelphia, Baltimore and Washington to Mobile and New Orleans. Other trains with through sleeping-car service from the same cities, including direct sleeper from Boston to points along the Gulf Coast. Convenient hours of arrival.

Let us send you an interesting booklet, just issued, about the Gulf Coast as a place to live and prosper. Address R. D. Pusey, General Passenger Agent, L. & N. R. R., Room 303, 9th & Broadway, Louisville, Ky.



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// An unusual investment that pays big dividends

EXACTLY WHAT happens when a motor car runs mile after mile, day after day—under all sorts of conditions?

To get the *facts*, General Motors has invested more than a million dollars in an 1125-acre Proving Ground, about 40 miles from Detroit.

Here cars are driven day and night under constant observation and tested for power, hill climbing, braking power, speed, fuel economy, riding comfort and other qualities.

In a month a car goes more miles than the average owner would drive in a year.

The Proving Ground is an unusual investment which pays big dividends—dividends in facts, quickly ascertained and employed to maintain quality and increase the values in General Motors cars.

An interesting illustrated booklet on The Proving Ground will be mailed if a request is addressed to the Department of Publicity, 224 West 57th Street, New York City.

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CADILLAC · GMC TRUCKS · YELLOW CABS, BUSES *and* TRUCKS

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5 daily trains to California

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The Chief

new Santa Fe train de-Luxe

You really enter sunny California the moment you step aboard one of the five famous Santa Fe cross-continent trains.

The new *Chief*—extra fare—is the finest and fastest of the Santa Fe California trains. Only two business days on the way.

For luxury—supreme comfort—and charming refinement it is unparalleled in the world of transportation.

$10.00 extra fare from Chicago, and $8.00 from Kansas City.

Fred Harvey Club and Dining car service sets the standard.

You will want to take the Indian-detour—by Harveycar through the land of prehistoric America. Also stop at Grand Canyon.

mail this coupon

Mr. W. J. Black, Pass. Traf. Mgr., Santa Fe System, 1126 Railway Exchange, Chicago, Ill.
Send me free Santa Fe folders of trains and trip to California.

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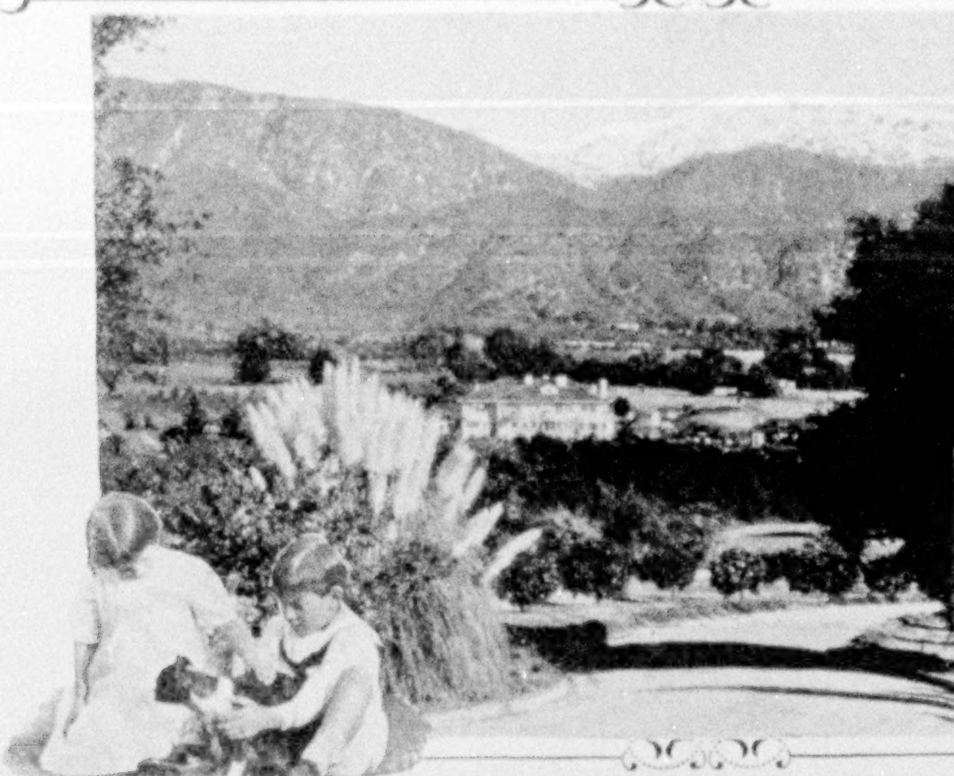


Outdoors the year 'round here.

Great estates spot the landscape at Flintridge.

The fascinating shore line at Laguna Beach

Here's Re-Creation

in a land of *difference*

Beautiful Santa Barbara Mission.

LET the genial warmth, the gorgeous sunshine, the flowers, and the pure, sweet, balmy air of Southern California remake you in a day.

Get out into the vast stillness of high mountains. Go down to the seaside and lie on the sand.

Play golf or tennis in the morning and try skiing or tobogganing in the afternoon of that same day—ride horseback, go camping, fishing, sailing, anything that pleases you—indulge *your hobby*, whatever it may be.

Motor to a hundred interesting places—over 5,000 miles of paved boulevards—see Old Missions where Spanish padres taught the Indians, enjoy the great Yosemite National Park (now made available to winter visitors through the opening of a fine, new motor highway).

Travel past scores of miles of orange groves in bearing. Picnic in a pretty canyon beside a tumbling brook. Climb a mile-high mountain by trolley.

Or enjoy an hour or two of cosmopolitan gaiety in the midst of a great city, said by globe trotters to be one of the most entertaining in the world.

Arrange a *circle trip to see the entire Great Pacific Coast*—Los Angeles, San Diego, San Francisco, Oakland, Portland, Tacoma, Seattle, Spokane. Your ticket agent will gladly tell you all about it.

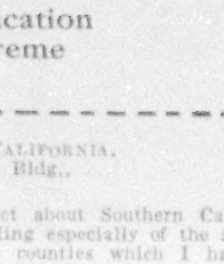
Living costs and rates at fine hotels or modest board ing places are exceptionally reasonable.

New 63-hour trains now make the trip five hours shorter from Chicago to the Coast.

Plan now to take advantage of these opportunities.

We have issued probably the most complete book on vacations ever put in print, 52 pages, illustrated, telling all about Southern California's offerings.

Before you lay this magazine aside, clip the coupon which will bring a copy free to you.



Your favorite sport is here.

Southern California

All-Year Vacation
Land Supreme

The city of Los Angeles, with a population of well over a million, is the largest city on the Pacific Coast and is the hub of one of the country's richest agricultural communities.

The growth, wealth and marvelous resources of Southern California are indicated by the following facts and figures pertaining to the County of Los Angeles alone:

Value of Agricultural and Live Stock Products (1925), \$85,912,744; Value of Citrus Products (1925), \$23,241,503; Oil Production (1925), 140,000,000 bbls.; Harbor Imports (1925), 4,156,177 tons; Harbor Exports (1925), 16,154,566 tons; total Harbor Tonnage, 20,310,743.

A producing season of 365 days a year permitting year 'round crops.

"The Sport of Kings."

ALL-YEAR CLUB OF SOUTHERN CALIFORNIA,
Dept. 12-D, Chamber of Commerce Bldg.,
Los Angeles, California.

Please send me your free booklet about Southern California vacations. Also booklets telling especially of the attractions and opportunities in the counties which I have checked:

☐ *Los Angeles* ☐ *Orange* ☐ *Riverside*
☐ *San Bernardino* ☐ *Santa Barbara* ☐ *Ventura*
☐ *San Diego*

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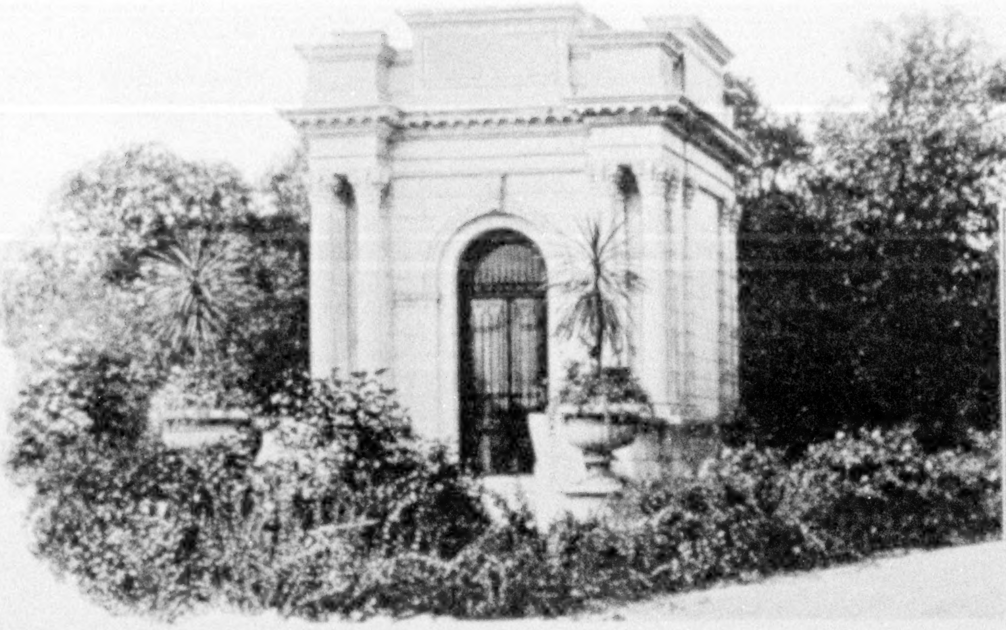
City .... State ....



L. C. Smith Mausoleum, Syracuse, N. Y.—Victoria White Granite

A Supreme Memorial in Stony Creek Granite

BEAUTY for a day, promptly erased by the hand of time, is typical of many things in human experience. The test of time is the only sure test of the lasting qualities of material things.

As everlasting as the hills themselves, Dodds superb granites, fashioned into Memorials of richest beauty, stand sentinel over the resting places of thousands.

EXCLUSIVE PRODUCERS: *Milford Pink Granite* - *Stony Creek Granite* - *Victoria White Granite*
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(ESTABLISHED 1864)
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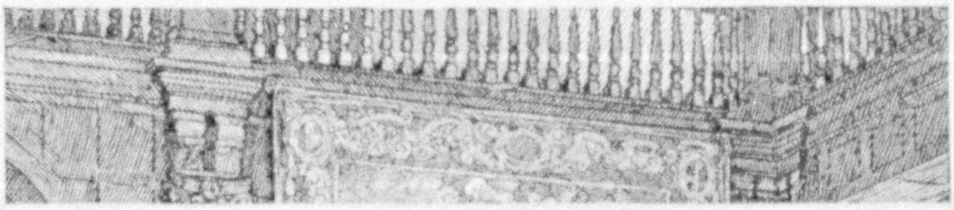
Quarries and Manufacturing Plants: MILFORD, MASS. KEENE, NEW HAMPSHIRE STONY CREEK, CONN.

Your Copy of "Modern Memorial Art" Sent if Requested.

IMPERIAL TABLES are made of beautiful woods by master craftsmen of Grand Rapids. The designs are inspired by the great art periods of history. To possess a distinguished Imperial Table is a source of pride to one who loves fine things in the home.

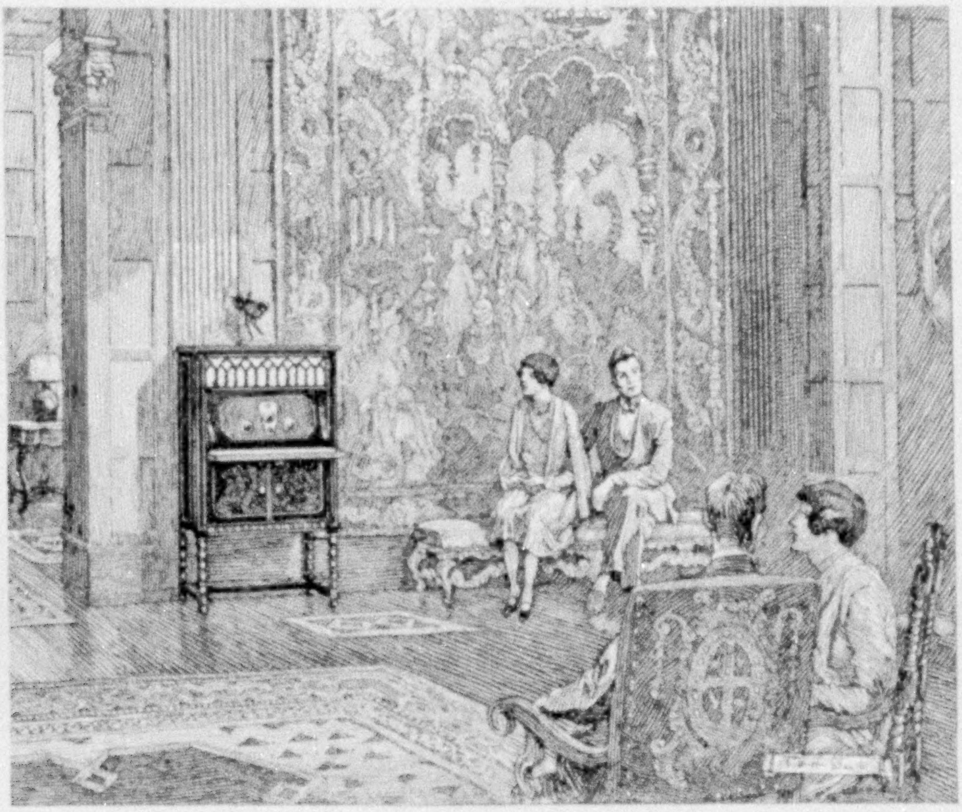
We have just published a new book entitled "Inside the Door" which shows the late designs in tables and suggests new ideas in home furnishing. If you would like this book, write Dept. G, Imperial Furniture Company, "World's Greatest Table Makers", Grand Rapids, Michigan.

Imperial Tables
Grand Rapids



FREED-EISEMANN

THE RADIO OF AMERICA'S FINEST HOMES



ALWAYS FIRST IN SOCIAL PRESTIGE

Now at prices everyone can afford

EVERYWHERE throughout the land—in the homes of the leaders of finance, society and the arts—you will find the FREED-EISEMANN. Among other distinctions, it was selected by government experts and purchased by the Navy for installation on the President's yacht.

Now, after two years of planning and experiment, we are able to announce FREED-EISEMANN *quality unchanged—but at new, low prices that have amazed the radio public.*

Think of it! Sets made with the same micrometer precision; the same devotion to high technical ideals, for which FREED-EISEMANN is famous, now priced as low as $60!

FREED-EISEMANN OFFERS REVOLUTIONARY RADIO IMPROVEMENTS AT NEW LOW PRICES

$60 *and up for table sets*

$95 *and up for console sets*

Prices slightly higher in Canada and West of the Rockies

And this year, FREED-EISEMANN embodies revolutionary radio improvements: Complete metal shielding from outside interference. One tuning control instead of three. Steel Chassis construction. Superb cabinets. Sets can be run from house current with FREED-EISEMANN power units.

No wonder that within a week after the new FREED-EISEMANN was announced, our vast, new plant had to go into full production in order to meet the great demand.

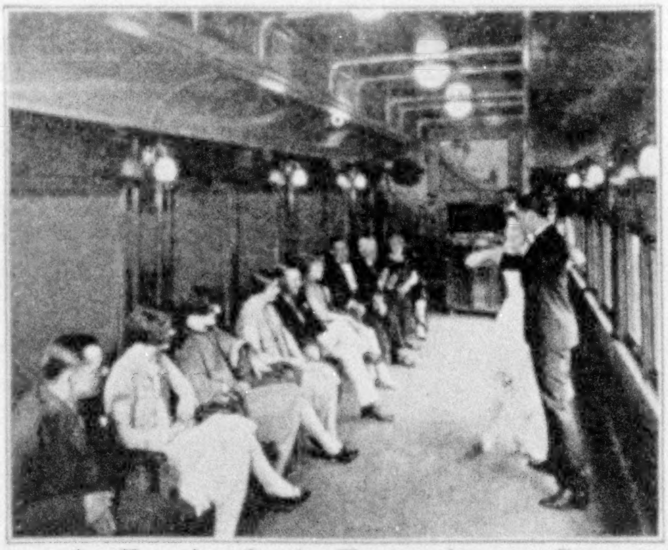
Shown above, Model 40*—C40, $155.

**Licensed under a group of the Latour Patents*

You may have a demonstration in your home without obligation, and pay on convenient terms.

FREED-EISEMANN RADIO CORPORATION
Freed-Eisemann Building, Brooklyn

LAND CRUISES to CALIFORNIA



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The finest railroad trains in the world

Built exclusively for Raymond-Whitcomb

Entertainment Cars with moving pictures, radio, gymnasium, and library.

Rooms with Private Baths — Many Drawing Rooms — Observation Cars.

From the East every week this winter by special trains going to California without change.

Add but three days to your regular trans-Continental schedule and include comprehensive sightseeing in such renowned American localities as the Louisiana "Evangeline Country", the Texas-Mexico Frontier, the Apache Trail, the Southwestern Indian Lands and the Grand Canyon.

Send for the

Land Cruise Booklet

This new service will help you.

Raymond & Whitcomb Co.

Executive Offices

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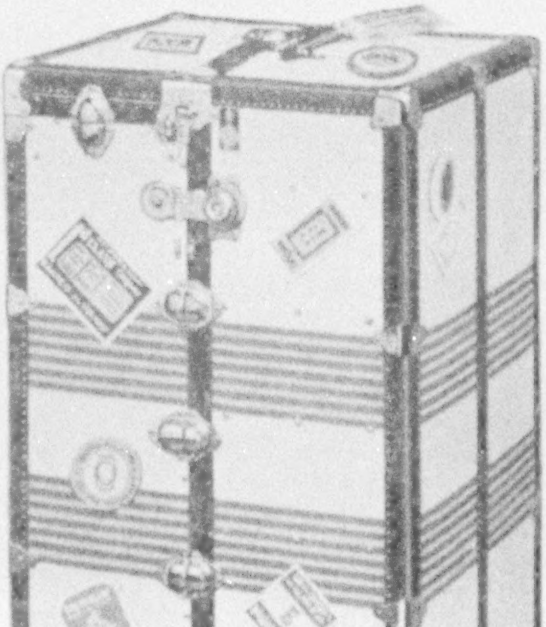
New York San Francisco Philadelphia Los Angeles Chicago

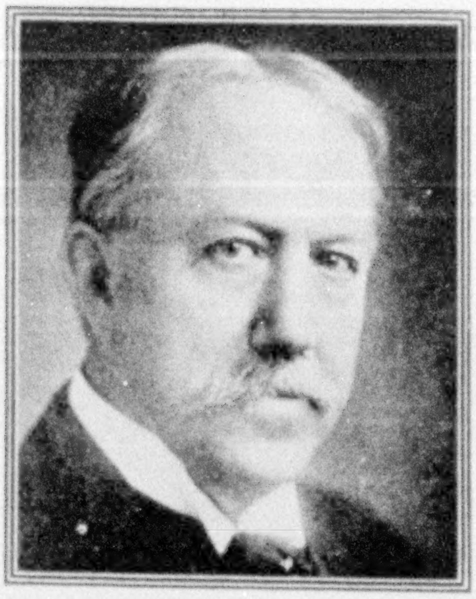
Have you noticed how little you hear the term "baggage smasher" nowadays? One reason is the increasing number of Oshkosh Trunks in service.

An attractive booklet describing Oshkosh Trunks will be sent you on request to 467 High Street, Oshkosh, Wisconsin.

OSHKOSH TRUNKS

THE OSHKOSH TRUNK COMPANY
Oshkosh, Wisconsin, and New York City





To know

the great mysteries of existence

is to add to your conquest and understanding of life

Dr. DAVID STARR JORDAN
Chancellor Emeritus
of Leland Stanford University, says:

"The rapid advance in scientific knowledge during the past decade is but an index of what may be expected during the coming years. Science will more and more affect our lives. Intelligent men will keep themselves informed of what the scientists are achieving."

THIS is indeed an uncertain age. False theories that have endured for centuries are being shattered. Amazing strides into the unknown are being achieved. Discoveries by the great men in many branches of science are revolutionizing our lives and thoughts.

Many of these men, our foremost scientists in all parts of the world, tell of their discoveries and progress, clearly and simply, on the pages of Scientific American.

More and more forward-looking people turn to Scientific American, month by month, for the actual facts regarding scientific developments. They feel they need this vital information to complete their understanding of life.

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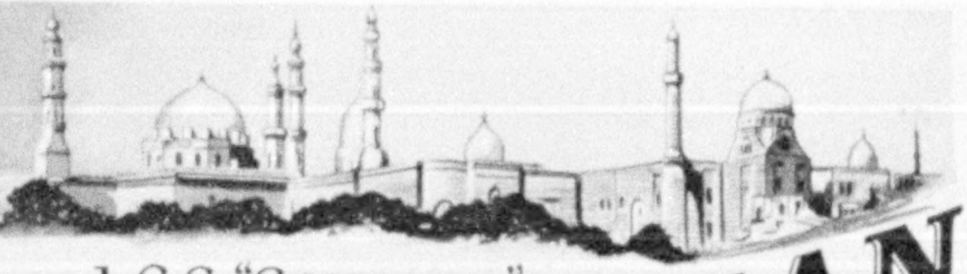

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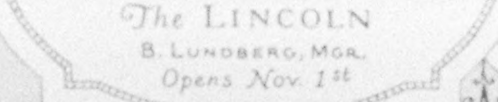
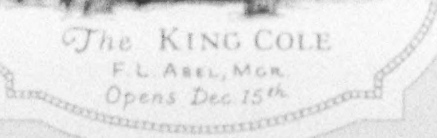


The LINCOLN
B. LUNDBERG, MGR.
Opens Nov. 1st



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LINCOLN
FAULTLESS precision gives that matchless reliability which makes the Lincoln car *master* of every travel demand — with incomparable smoothness and high speed, indefinitely *sustained*.
Lincoln appearance is conservative yet commanding — every detail of appointment conforming to the edicts of good taste.
Best of all — the Lincoln you drive today is the car of your pride next year and far into the future!
LINCOLN MOTOR COMPANY
Division of
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A Folder is *Only* a Folder

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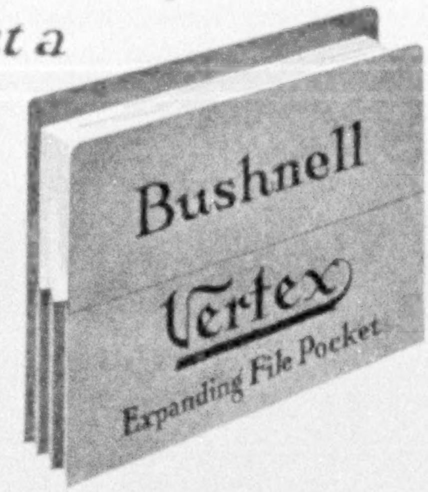

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that never slumps down in the file-drawer, but stands erect, with the index-tab always in plain view; holds three or three hundred letters with equal facility; is easy to remove or replace in the file; holds small papers as well as large, with never a chance that they will become lost or mis-filed; saves time daily in filing and finding papers; improves instantly the efficiency and appearance of the drawer.

Ordinary folders lack all of these advantages. They were never intended to contain many papers, or for continued use. Your own files will show the need of something better than folders for your heavier correspondence.

You will know what REAL Filing is, the minute you install

Bushnell's VERTEX File Pockets

to replace the bulkiest of your present folders.

But first try a single sample without expense or obligation. The coupon below will bring it

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Please send for examination and trial a free sample of Bushnell's Paperoid "VERTEX" File Pocket, as described in December National Geographic.

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s s "California" sailing Jan. 19

7th cruise, including Havana, Panama Canal, Los Angeles, Hilo, Honolulu, 19 days Japan and China, Manila, Java, Burma, option 17 days India, Ceylon, Egypt, Palestine, Greece, Italy, Riviera. Europe stop-overs.

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"If You Hear of Anything"—

THE tragedy of men and women who are "too old" is occurring day after day. The same heart-breaking anxiety and reluctance to have the world know that they are no longer of worth and importance in business affairs.

TWO men, neighbors, were seated in the smoking car of a suburban express. As the train pulled out the better dressed man turned to the other genially. "Well, Jim, how are they treating you? Keeping you busy?" The man called Jim slowly shook his head. "I am being let out the first of the month . . . too old . . . If you hear of anything, I wish you'd let me know."

One by one the influences which work against healthful and happy living are being overcome. Life expectancy is being lengthened, disease is being stamped out, housing and working conditions are being improved. And now the next great forward movement is taking shape—to free old age from dependence and want.

It is a splendid sign of the times that great railroad systems, banking institutions, large industrial corporations and practically all lines of business are working out plans either to provide retirement incomes for their employees or to place their existing plans on a sound and scientific basis.

And even in smaller organizations, plans are being made to insure comfort and protection when working days are over.

Intelligent workers are finding out all they can about such incomes and are talking the matter over with their employers. Wise employers are analyzing the best methods of providing retirement incomes for those who look to them for advice and guidance.

A retirement income is a regular, fixed income for life, paid during all of the sunset years, whether or not one ever works again. Haunting dread of dependence in old age can be made a thing of the past. The Christmas season will be happier for those who provide for the peace and comfort of their own future—or the future of others.

The Metropolitan Life Insurance Company has made a comprehensive study of more than 350 pension plans in operation—all of them attempts to prevent that great tragedy, penniless old age.

Some of these systems are good, some fair and some hopelessly involved. Some, inspired by generosity but not soundly based, may result in costs so heavy as to make their continuance impracticable. Haphazard pension plans which are almost certain to come to grief should be replaced by scientific reserve methods.

After a thorough study of the pension problem, the Metropolitan is prepared to offer employers and employees a practical outline of the requirements of a sound retirement income plan.

If you are a worker, wondering about your old age, or an employer, planning pensions for the workers in your business or your home, send for "Sound Retirement Plans and What They Should Provide". Mailed free on request.

HALEY FISKE, *President.*

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NUTS CHOCOLATE COVERED—Whole nut meats, embedded in rich chocolate.

Vol. L, No. 6 WASHINGTON December, 1926

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SKIRTING THE SHORES OF SUNRISE

Seeking and Finding "The Levant" in a Journey by Steamer, Motor-Car, and Train from Constantinople to Port Said

By Melville Chater

Author of "Motor-coaching Through North Carolina," "History's Greatest Trek," "Rediscovering the Rhine," "Through the Back Doors of France," etc., in the National Geographic Magazine

NOT to know where you are going—to let luck hand you a lottery ticket instead of a travel itinerary—is an adventure worth having. Four of us at Constantinople decided to try it.

"But where are you going?" It was the captain of a 300-ton Italian freighter lying at Galata Quay who thus countered our proposal to take passage.

"We don't know," we told him. "But where are *you* going?" At that he grinned.

"I don't know, either. It's according to freight. From port to port, through the Levant."

We signed up with this man after our own heart; then set about ascertaining exactly what and where the Levant is. In fact, one always hears it referred to with this same sweeping magnificence; yet to say, "I have business in the Levant" is quite as vague as to say, "I have an engagement inside the Arctic Circle."

TRYING TO LOCATE THE LEVANT

The result of our inquiry was somewhat confusing. A Bulgarian told us that the Levant was in the Transcaucasus region; a Turk said that it was in Asia Minor; a Greek declared that it was another name for Anatolia; a Cypriote placed it in Syria, and a Lower Egyptian in Palestine. I dare say that an inquiry made on Galata Bridge, where a dozen or more different nationalities pass between Stamboul and Pera, would have resulted in as many different answers.

"If you will climb the tallest minaret in Stamboul at sunrise," a venerable American missionary told us with a smile, "you will get a splendid view of the Levant."

We jumped at his suggestion, keen for a bird's-eye view of Constantinople.* Next dawn we ascended a lofty minaret—so lofty that we could see the lifting sun kindle the snowy outline of the Asian Olympus while yet Stamboul crouched indistinguishably gray upon her seven hills.

Then Anatolia's plains caught the speeding flush, the Bosporus blazed around its silhouetted battle fleet of five nations, and its ribbonlike estuary, where huddled silent ships and stacked masts, became indeed the Golden Horn.

* See, also, in the National Geographic Magazine, "Constantinople and Sancta Sophia," by Edwin A. Grosvenor, May, 1915; "Constantinople To-day," by Solita Solano, June, 1922; "Life in Constantinople," by Harry Griswold Dwight, May, 1915; "Grass Never Grows Where the Turkish Hoof Has Trod," by Edwin Pears, November, 1912, and "Under the Heel of the Turk," by William H. Hall, July, 1918.

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THE GALATA BRIDGE, CONSTANTINOPLE, FROM ONE OF THE MINARETS OF AN OVERLOOKING MOSQUE

This bridge is sometimes called the Crossroad of the East, for here, in twelve hours, one may see all the nationalities of the world. In the distance is Pera, the European quarter of Constantinople.

High over sleeping Stamboul gleamed groves of slim minarets, like extinguished watch-candles of the night. And last, roof by roof, the red-tiled, street-rutted city shone forth in multicolored design, as if, with the sunrise, a bazaar-gate had been flung wide and some great outstretched rug had glowed into warm life.

It was magnificent. We descended streetward for breakfast, then got aboard our boat.

This tiny craft, a stranger to lifeboats and solar regularity, had, beside a skipper, six seamen, a set of secondhand engines, a pilot house which did duty as a messroom, and an available hatch. Soap and water and partitioning effected by stretching army blankets on ropes transformed the hatch into four curtained receptacles—one could not say staterooms—for our party.

Our baggage came aboard in charge of a Turkish porter. When he emerged from the labyrinth of curtained recesses he announced:

"The luggages are aboard, sirs and ladies; but I do not know whose is what or which is in where."

THE "SAN GIORGIO" SAILS

As to the ship, we had our doubts about this seagoing minnow of uncertain age. "Are you sure her engines will work?" we anxiously inquired of the skipper. To which he grinned, pointing to the name on the taffrail, "*San Giorgio*, big Italian saint, protects her." And so when, at the appointed hour, the rusty capstan actually started to grind and the secondhand propeller to revolve, we were forced to admit that all the miracle-working saints were not dead yet.

We swung out of the Bosporus and into the Sea of Marmora.

Among the Princes Islands we anchored long enough to visit several of them by motor boat. Of these, Halki especially breathes of an untouched simplicity and charm which is the more appreciated when one's marine glasses reveal across the way the cloudy city where hive Constantinople's teeming thousands.

Instead of the monster summer hotels which the proximity of an American metropolis would bring to such a spot, one finds nothing of Constantinople among these pine-darkened, sea-commanding heights except hill-topping monasteries, where medieval emperors, blinded or in chains, passed their exile.

Sheep bells tinkle among the olive orchards. Down the road, with his laden donkey, comes the seller of charcoal or drinking water. In the tiny square sit silent, net-mending fishermen. And that is all, except the monastery bell clanging its angelus under the glow of a sea sunset. Constantinople might be oceans away.

WHERE THE YOUNG TURKS BANISHED CONSTANTINOPLE'S CANINES

The exile ground of emperors and dogs—that spells the melancholy history of these lovely islands. Constantinople's age-old dog pest developed under the Koran's benign injunction of kindness to dumb creatures—a stumbling block which the Young Turks of 1908 sought to circumvent by offering the entire canine population to a Christian glove manufacturer. Upon his declining this dog concession they shipped the round-up of pariahs to barren Oxia, one of the Princes group, where the outcasts incontinently devoured one another.

From the islands it is only a step across the Marmora to its Asiatic coast, where the *San Giorgio* ran some forty miles up the charming Gulf of Ismid. A dirty hillside town, passingly enchanting under the springtide glow of fruit blossoms, was all we found remaining of Nicomedia, the once proud city of Diocletian (modern Ismid).

But Rome's bridges have outlasted her empire, and as we neared the head of the gulf the inhabitants of Greek villages which had been burned by Kemalist irregulars came thronging across the stone archways built of old for the passage of Roman legions into Asia Minor.*

A PALACE OF THE ARABIAN NIGHTS

Descending the gulf, we passed at Derindje a relic of the latest bid for empire in the shape of a vast warehouse containing a million and a half square feet of

* The Greek population of Asia Minor has since been deported to Greece (see "History's Greatest Trek," by Melville Chater, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1925).

Drawn by James M. Darley

"THE SHORES OF SUNRISE"

The author's journey was made on a small Mediterranean freight steamer from Constantinople to Alexandretta, thence by train and automobile to Port Said.

floor space, constructed by German engineers for the storage of grain arriving over the Bagdad Railway.

Still farther along, at Hereke, we found the Palace of the Genie, as we named it, which was built almost overnight by Sultan Abdul Hamid for the purpose of entertaining his friend William when, in 1910, the German Emperor passed en route for his tour in Syria and Palestine.

Here, in this charming, sea-bordered villa, sultan and emperor dined and chatted for three hours, while the special train waited; then they parted, and this creation for one Arabian night, untenanted before or since, passed into the realm of yesterdays.

The near-by presence of a German fez factory probably explains William's stop-off in this tiny town.

Fez-wearers among American fraternal orders may be surprised to learn that the production of this simple, caplike headwear entails as many complicated processes as the manufacture of derbies and straws (see illustrations, pages 654 and 655).

The high-grade woolen yarn, received from Europe, is spun on to a large bobbin, from which it is worked by a knitting machine into triangular sections of cloth. These are hand-sewn into foolscap shape and are then thrown into what might be described as a beating bath, where wooden

IN THE COCOON MARKET AT BRUSA

To-day the sultan and sultana of Brusa are a pair of white, brown-spotted worms, producing the royal fabric for which the city has been famous for centuries (see text, page 655).

hammers knead the wet foolscaps, reducing them in size and consolidating them into felt. They are next fitted upon metal forms and baked in an oven, issuing in a wearable but not yet decorative state.

Fez-shaped cages, each fitted with eight revolving brushes, now work the felt into a nap, which is shaved to the proper smoothness. The sweepings go to make Turkish cushions. Finally the fez is dyed, given an extra close shave, and fitted with the tassel tube, which has been woven from the yarn by a special machine.

WHY THE TURKISH FEZ IS BRIMLESS

Though the finished product is undeniably smart, this brimless head covering seems curiously unsuited to a land of dazzling sunshine. When, however, one has seen a mosque full of fez-adorned Turks, bowing their foreheads so as to touch the floor, the appropriateness of the "lid" of Mohammedan countries becomes obvious.

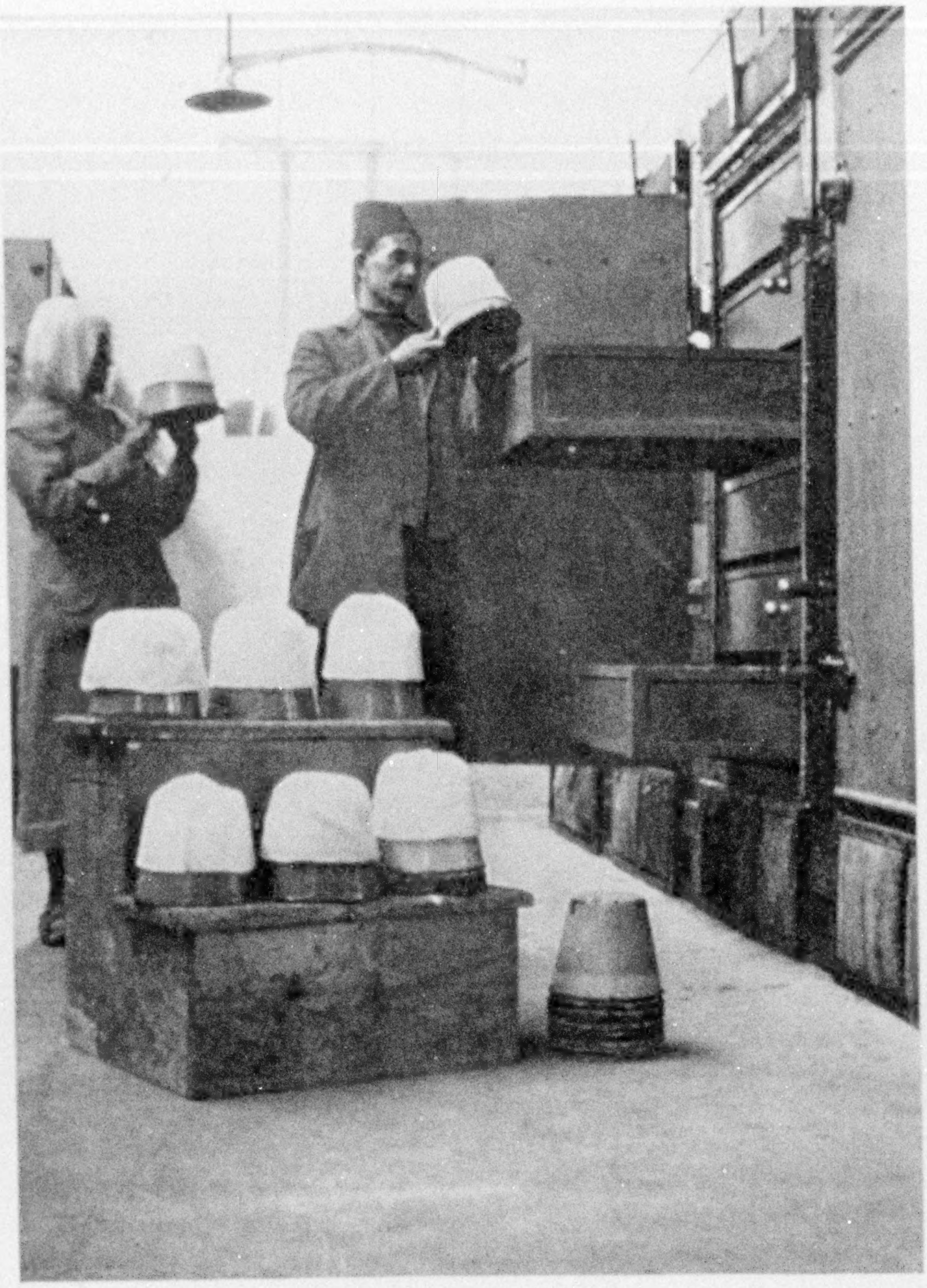
Whenever one's fez loses its jauntiness the owner has it ironed on a copper mold under a Turkish street sign which reads about like this: "Ali, patronized by pashas innumerable, cleans and blocks fezzes to the superb shapeliness of a new-blown rose."

With the close of the World War the cost of fez-wearing became insupportable. The retail price had risen from forty cents to three or four dollars. A boycott of the time-honored headgear was instituted. In October, 1925, the Turkish Government definitely decreed that those who could not afford a hat or cap with a visor must go bareheaded. The day of the fez is over.

A few hours' run along the Asiatic coast brought us within sight of the somnolent little port of Mudania, where the victory-flushed Kemalists decided not to swoop across the Allied-held straits to Constantinople.

"Olives," announced our skipper, by way of explaining his business there, adding that we would have time, if we so chose, to visit near-by Brusa.

Snaking upward through the hills lay



Photograph by Melville Chater

IN A FEZ FACTORY ON THE SHORES OF THE GULF OF ISMID

The beaten fez, still moist, is fitted on a copper form and baked in ovens, thus receiving its symmetrical shape (see text, page 652).

narrow-gauge rails, and a wheezy toot from a toy train warned us that it positively would not delay its departure beyond half an hour or so on our account. We caught it in just twenty minutes, and the engineer politely thanked us for not having kept him waiting longer.

WHERE THE TURKS PAUSED BEFORE THE CAPTURE OF CONSTANTINOPLE

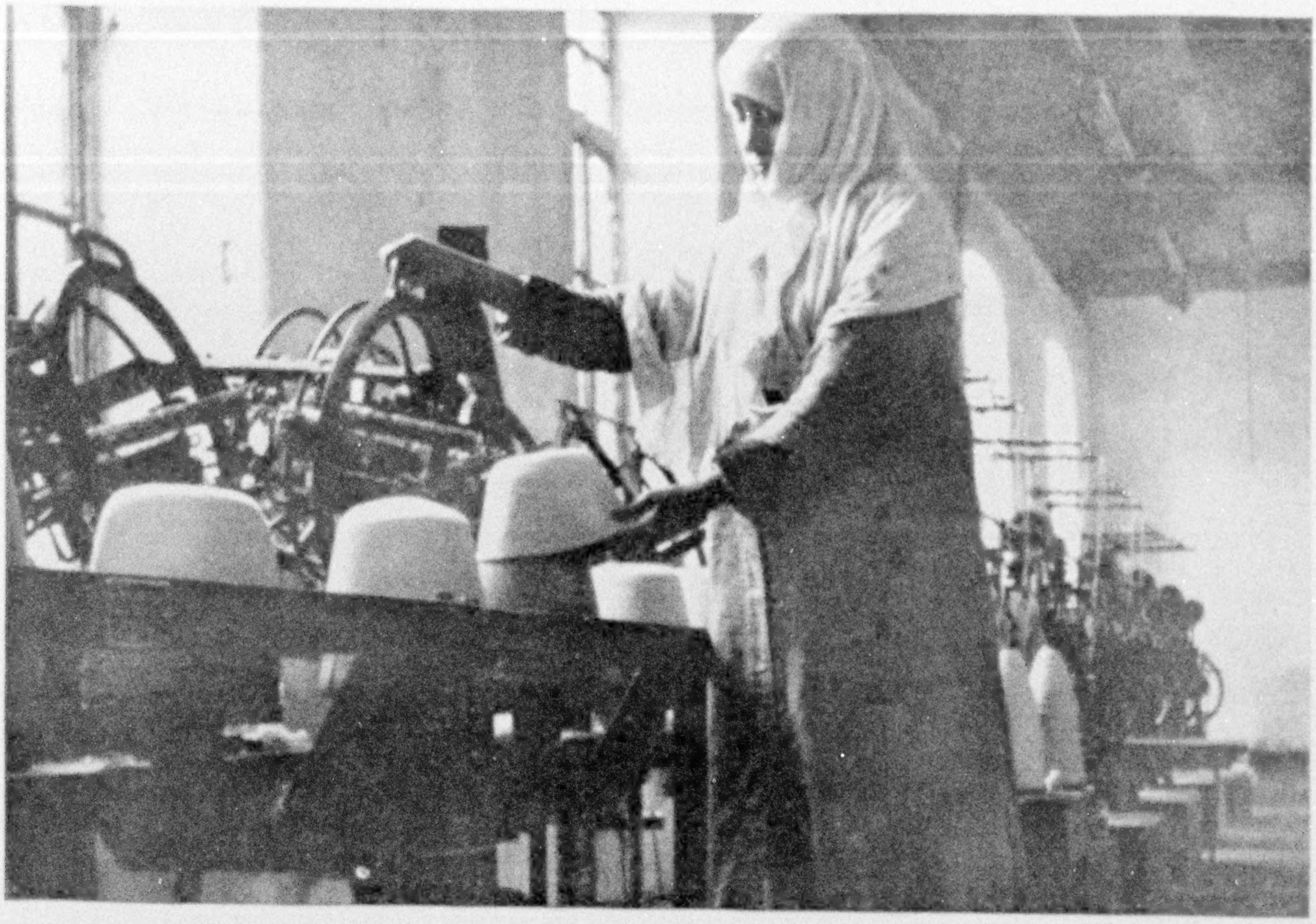
Gradually widening vistas, where mile on mile of olive and mulberry groves clad the sea-skirting hills, revealed the countryside's two staples as well as the presence of a predominant Greek element. The olive, the cocoon, the seaboard—for centuries the Anatolian Greek has identified himself with this trio. And, rising ahead of us, the Asian Olympus recalled by its very name that Greek colonists were here, christening landmarks in honor of sacred spots at home, many centuries before the Turks began their big westward push across Asia Minor.

Along the flanks of overshadowing Olympus, Brusa scatters itself like some great patch of white wild flowers, almost fairylike in its aërial grace, with mosque domes resembling rich blossoms and minarets the slender stalks, as they rise against the somber cypress groves.* So many mosques are there that one is tempted to imagine that, flowerlike, they seeded themselves at random whenever spring winds blew. "A walk for each day in the year, a mosque for each walk," runs the proverb of Brusa.

Everywhere a charm as subtle as the hues in a time-mellowed rug haunts this 14th-century capital of the sultans, whither flocked poets, scholars, and holy men from Persia and far Bokhara a hundred years before Constantinople's falling walls yielded Mohammed II a European threshold to empire.

By studying Brusa's mosques, named for successive magnificent sultans, and by deciphering the epitaphs on innumerable turban-topped gravestones recording the virtues of her lawgivers, historians, and venerated *babas* (fathers), one could al-

* See Color Series, "Sun-Painted Scenes in the Near East," in the National Geographic Magazine for November, 1925.



Photograph by Melville Chater

UNTIL RECENT YEARS THE TURKISH FEZ WAS MADE ALMOST EXCLUSIVELY IN EUROPE

After the headgear has been shaped (see illustration, page 654) it is put on a block and into a nap-raising machine. It is then shaved, dyed, and shaved again.

most reconstruct the epoch in which the Ottoman Turks rose from barbaric nomads into culture and power.

Turkish epitaphs, by the way, preserve a suave grace in their Oriental imagery, no matter how heart-rending the circumstances. Here is the inscription placed over a royal child who was strangled at Constantinople in 1843, according to that cruel custom which was designed to prevent collateral lines from aspiring to the throne:

> A flower which had scarcely bloomed was torn away from its stem. It has been removed to these bowers, where roses never fade and where its parents' tears will shed refreshing moisture. Say a prayer for its beatitude!

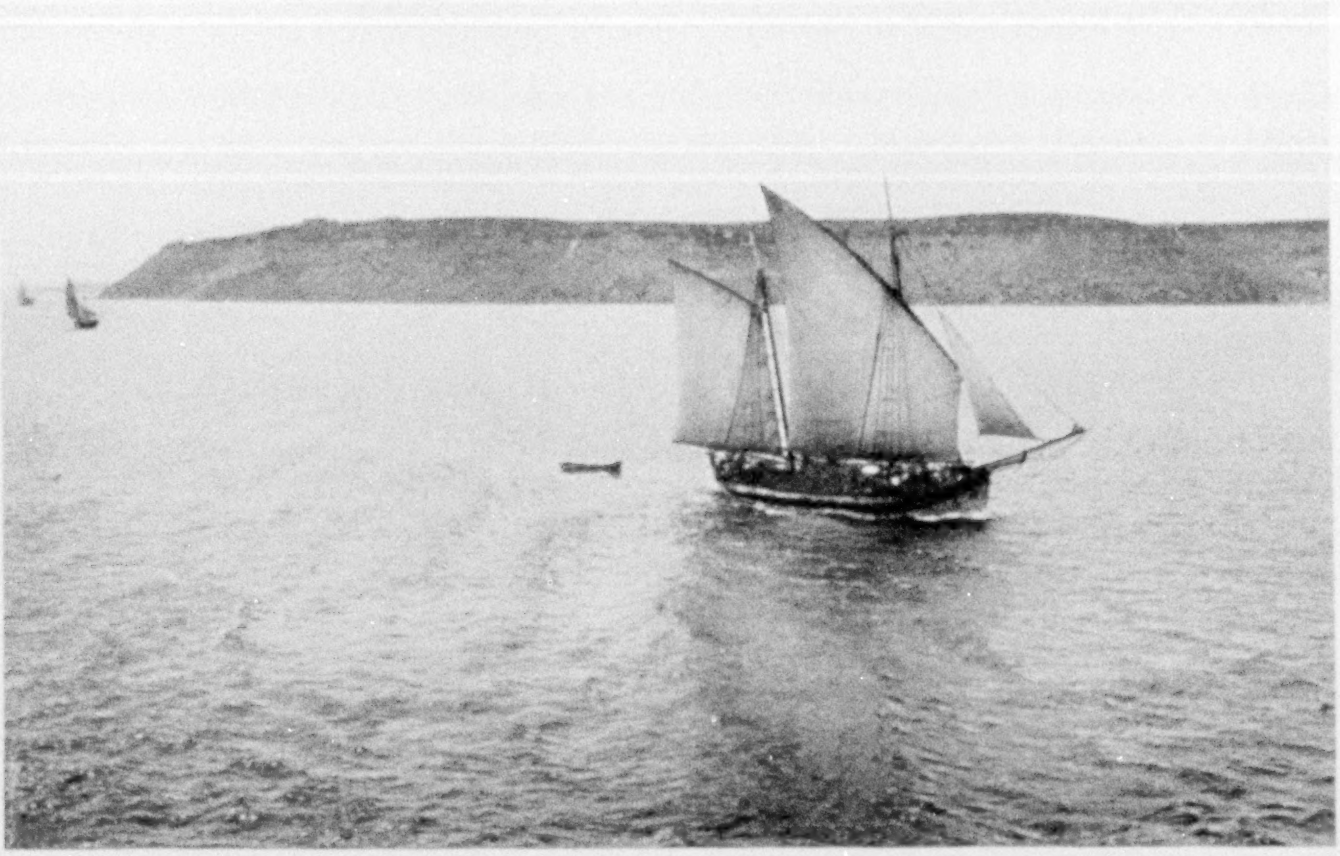
THE SILKWORM RULES AT BRUSA NOW

To-day the sultan and sultana of Brusa are a pair of white, brown-spotted worms. Indeed, they produce a royal fabric, whereby, to Near Eastern peoples, the name Brusa connotes silk, just as Kimberley connotes diamonds. Moreover, a Brusan treats them as royalty to the extent of turning his house over to them in the feeding season; for whenever his attic floor becomes covered with mulberry leaves, each with its hungry worm, he carpets the rooms downstairs with more leaves and sleeps out in the garden.

During the war, when the silk factories were destroyed, the workers dispersed, and the very mulberry trees cut down for fuel, Brusa's ancient industry was, to all appearances, dead; but in 1919 returning refugees found, to their amazement, that its germ had survived. A mere handful of old women, who had remained in the town, had saved a few mulberry trees and had guarded, season after season, the cycle of cocoon, moth, hatched-out eggs, and feeding worm. In time of war they had prepared for peace.

The silkworm has a voracious appetite for a creature 3½ inches long, and during its brief life of thirty days it consumes six times its own weight in mulberry leaves.

After this sumptuous repast, and having shed its skin four times, it spins around itself a cocoon made of a double fiber of silk, each fiber being not uncommonly 400 yards long. A fortnight later



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THE ENTRANCE TO THE DARDANELLES

This narrow strait, separating Europe from Asia and leading up to Constantinople, is one of the most important waterways in the world, both strategically and from a commercial standpoint (see text, page 657).

it softens the inclosing silk with its saliva, then pushes forth as a moth.

After pairing, the female moth lays 400 eggs or more; then, her usefulness over, she dies. The cultivator, having chosen the best eggs for breeding purposes, incubates them for thirty days, at a temperature well below blood heat, when a fresh crop of worms is hatched.

SILK SPINNING REQUIRES KEEN SIGHT

The cocoons chosen for the silk factory are steamed, so as to kill the inclosed life. Then they are steeped in basins of hot water; the gelatinous matter is thereby softened, and machines begin to wind off the silk filament. This is so fine as to be invisible to a casual glance, and the attached cocoon, bobbing about in the hot water like an animated peanut, seems almost alive. But the keen-eyed woman tender can watch for kinks in a score of such gossamer filaments, as she feeds them into the spinning machine in multiples varying with the weight of the thread required.

By the time one has watched the equally delicate process of weaving in intermingled colors, and has learned of the incredible number of silkworms that have died in order to produce one's necktie, the wearer is undecided whether to take off his hat to the heroic worm or to the Empress Siling, who, according to Chinese tradition, first learned to exploit it 4,500 years ago.*

Before returning to the port, we attended the Easter banquet of the Greek troops, who were then occupying Brusa. Pairs of hard-boiled eggs were struck against each other, the holder of the uncracked egg supposedly capturing a year's good luck. Homeric quantities of mutton were spitted. Toasts were drunk, the first few drops of wine being purposely spilled—a survival of the pagan custom which constituted their "grace before meat." Royalist marching tunes were tinkled on mandolins.

One officer, who had looked fondly upon an American girl of our party,

* For an account of the silk manufacturing industry, see "Pennsylvania: The Industrial Titan of America," by John Oliver La Gorce, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1919.

Photograph by Melville Chater

BRUSA IS SCATTERED ALONG THE FLANKS OF OVERSHADOWING OLYMPUS

The medieval capital of the Ottoman Turks is a city of mosques and minarets embowered in cypress groves.

pressed upon her, as a special titbit, a roasted sheep's eye. The rest of us made ineffectual efforts to relate this queer custom to our homely phrase of "casting sheep's eyes."

"What herb is this meat cooked with?" I asked one of the military K. P's.

"It is *daphne*" (laurel), he replied in Greek.

And, sure enough, it was the leaf of the tree into which Daphne, pursued by Apollo, was metamorphosed. We can attest that roast lamb flavored with a Greek myth is entirely satisfactory.

THE DARDANELLES HAVE LONG BEEN DEDICATED TO WAR

Leaving Mudania, our little craft was soon dipping seaward through the Dardanelles, where fortress-bearing heights gradually sloped, on the Asiatic side, into Troy's plain, and on the European into the sparsely clad spit of Gallipoli.

Surely, in the New World, magnificent residences would crown such sea-commanding heights. Instead, only a few mean villages dot the shores of that 43-mile passage, along which two continents face each other almost within shouting distance.

Those sixteen hundred yards which separate Sestos from Abydos have been dedicated to war for over two thousand years. There the ancient Persians crossed by boat bridges to invade Europe. There the Greeks under Alexander crossed to invade Asia; and in the middle of the 15th century the Orient's turn came again when the Ottoman Turks passed over at the same spot, planting their banner in Europe for the first time.

It is the ferry to conquest—or disaster. Legends of a seven years' siege beckon from the abutting Trojan plain, while just opposite, off Gallipoli, the Ægean ran blood-red with the terrible Allied

Photograph by Ewing Galloway

THE HARBOR OF SMYRNA

In the background a long row of freighters; lunch and candy stands in the foreground. Smyrna has a habit of rising from its ashes. Its present site was selected by Alexander the Great (see text, page 660).

losses of 1915. To-day some acres of wooden crosses, under the flying flags of England and France, alone mark the desolate scene of that modern Iliad.

The Dardanelles' surface tide attains to five miles an hour. Evidently the ancients thought that only the pangs of love, as in the case of Leander, would spur a swimmer to undertake the Sestos-to-Abydos feat. Yet Lord Byron swam it, as he boredly announced, "for fame," and quite recently a distinguished British commander did it merely to see if he was fit at fifty.

SMYRNA HARBOR IS UNIQUE

We gained the Ægean, where curious expanses of purple light, patching the level waters at sunset, proved Homer's epithet, "the wine-dark sea," to be the observation of a keen local colorist.

Before dawn we were entering between two guessed-at headlands, fifteen miles apart. For an hour or more we crept on, mist-inclosed, then ahead the sunrise came over the summit of a gray mountain, spilling down its seaward front, and we perceived that the mountain's base was clothed with an outstretched, red-roofed city—Smyrna.

An imposing gulf approach and fine docking facilities make Smyrna unique on the Asia Minor coast, whose other ports, long silted up, necessitate lighterage between ship and quay. Moreover, with Athens directly opposite, across the Ægean, one readily sees why the watchful Turks call Smyrna "The Eye of Asia Minor."

Thanks, perhaps, to our patron saint, San Giorgio, our skipper ran across a shipment of dried figs, the loading of which gave us time to hire a battered hack and ascend this hillside city to the Pagos, its culminating peak.

Fifty years ago Smyrna contained 150,000 people, of whom 80,000 were Turks and 70,000 were Greeks, Armenians, and Jews. A few years before the World War, with the population standing at 200,000, there were 60,000 Turks and 140,000 of other nationalities, the Greeks representing two-thirds of the grand total. These figures tell once more the old story of Turkey's own people in her

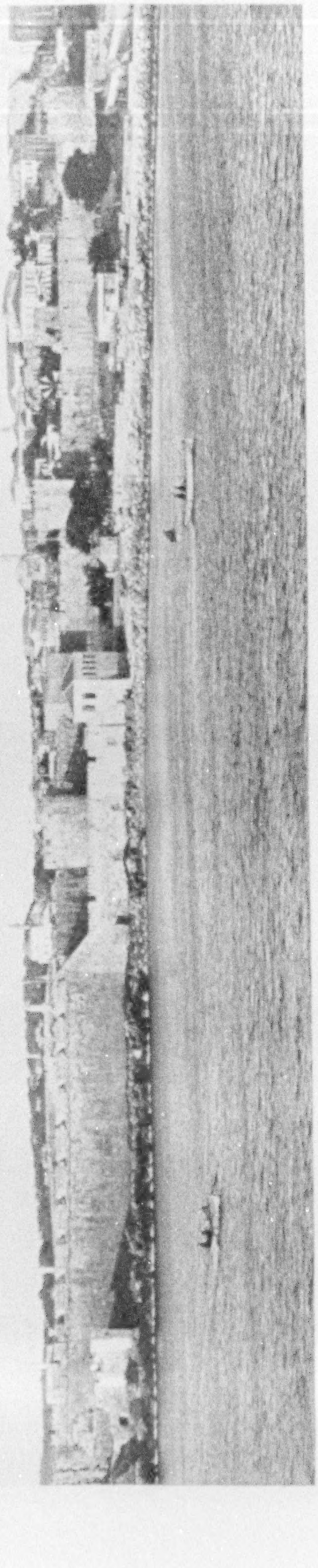
Photograph by Ernest B. Schoedsack

A WOMAN NOMAD OF SOUTHERN ANATOLIA

Photograph by Ewing Galloway

PEASANT CHILDREN OF NEW TURKEY

Under the régime of the new republic these youngsters are promised educational facilities which were unknown to their parents. Among the most recent reforms of the Angora Government is the prohibition of plural marriages (see, also, "Crossing Asia Minor, the Country of the New Turkish Republic," by Major Robert Whitney Imbrie, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1924).



WALLS THAT ONCE ECHOED TO ITS DEFENDERS' BATTLE CRIES IN EIGHT LANGUAGES

A panorama of Rhodes, the sea-fortress haunt of mailclad medievalism (see text, page 663).

own markets being outstripped in the commercial race—a race in which the Mohammedans have always been disadvantaged, in that, due to the Koran's injunction against usury, they have never been money lenders.

The lofty Pagos, surmounted by crumbled fortifications, commanded a wide panorama of red-roofed houses and fig orchards, with here and there a spiring minaret or a patch of funereal cypresses—a sunlit spectacle bordering the blue water sweep which stretched horizonward within the Gulf's embracing shores. Truly, the Eye of Asia Minor seemed to us well named.

THE EYE OF ASIA MINOR IS DIMMED

A few months later that magnificent, sea-girdled prospect was a mass of smoking ruins.*

But Smyrna has the habit of rising from its ashes. "Old Smyrna," a member of Asia Minor's league of free cities and also a member of the Homeric League, if one may so group the many cities which have claimed the great poet's nativity, was destroyed by the neighboring state of Lydia in the sixth century B. C. Thereafter it was rebuilt on its present site, as planned by Alexander the Great, and became known as New Smyrna.

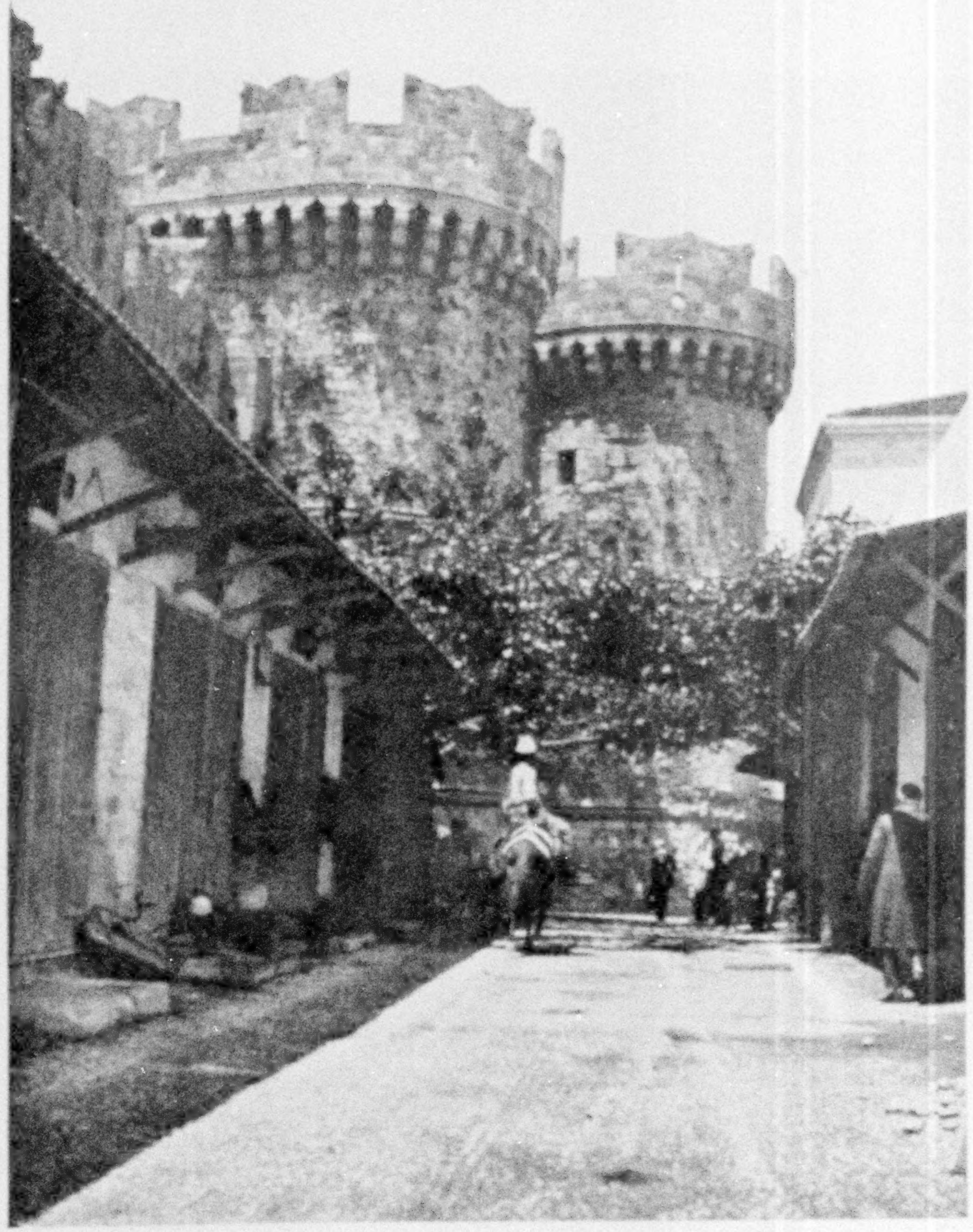
Early in the Christian Era it was leveled by earthquake, but rose again under the imperial direction of Marcus Aurelius. In turn it was seized by Turkish pirates, ruled by the Knights of St. John, ravaged by Tatars, conquered by the Osmanli Turks, and swept by plague and fire. Of all the ancient Greek settlements on the Asia Minor coast, it alone has retained its name and importance, and doubtless to-morrow a "Newer Smyrna" will arise on today's ruins.

That night, while threading through the Dodecanese (Twelve

* See, also, "History's Greatest Trek," by Melville Chater, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1925.

THE STREET OF THE KNIGHTS: RHODES

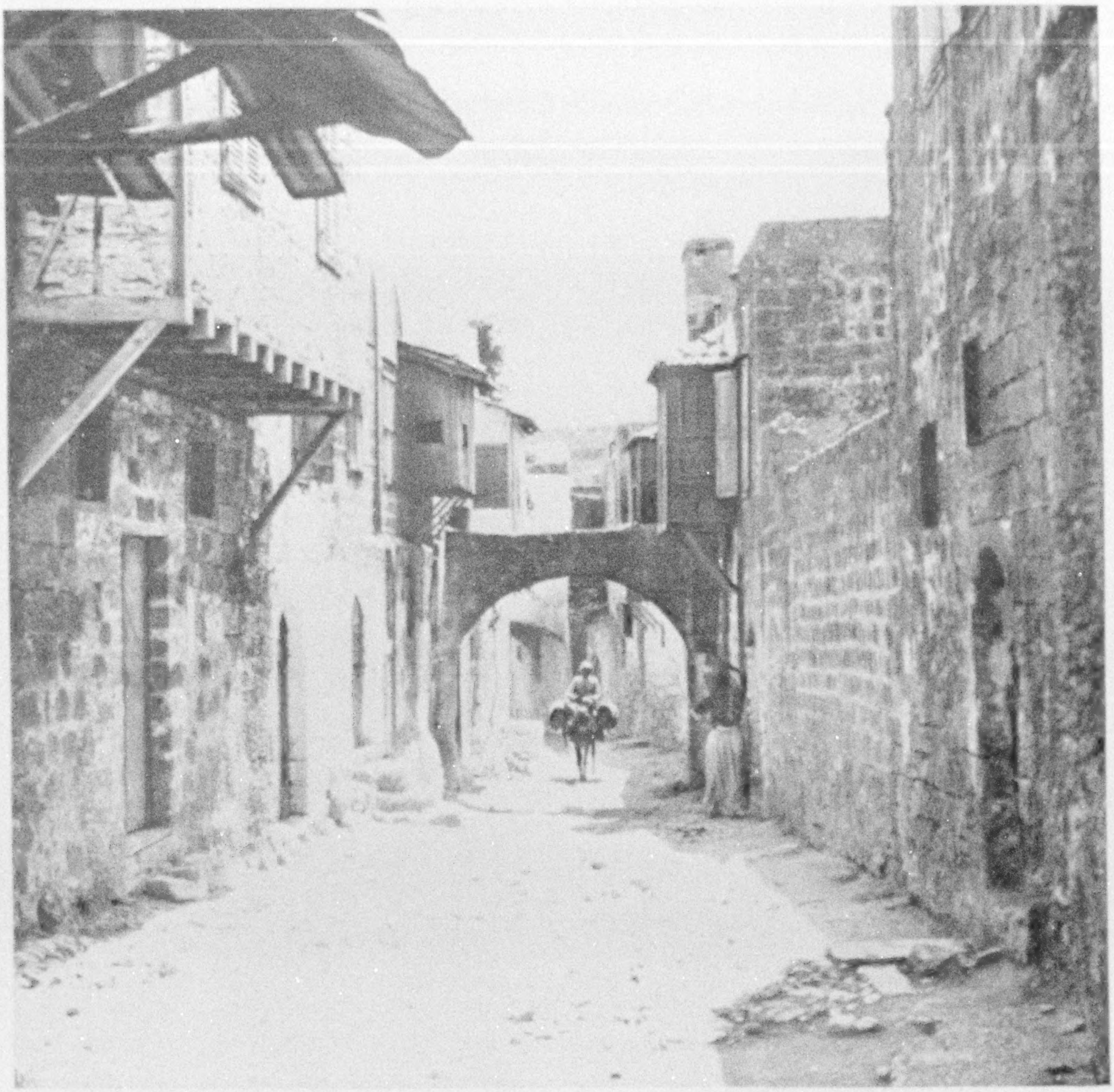
Note the Christian coats of arms and Moslem harem window, side by side. In medieval times each of the Eight Tongues represented in Rhodes had its auberge, or headquarters, where lived the chief, or "Pillar," of that Tongue. This auberge bears the arms of France, the arms of the Order, and those of Grand Master Fabricio del Caretto, under whose Grand Mastership it was built in 1518.



Photographs by Melville Chater

TOWERS OF ST. CATHERINE'S GATE: RHODES

Sea-facing walls which the knights of eight nations were pledged to defend surround the city of Rhodes. Soldiers of France, Germany, Auvergne, Aragon, England, Provence, Italy, and Castile all bled and died here to turn back the Turkish tide. In the final struggle, Sultan Suleiman I is reputed to have sacrificed 90,000 men of his army of 200,000 before the knights evacuated the city under an honorable capitulation.



Photograph by Theodore Leslie Shear

A STREET SCENE INSIDE THE GATE OF ST. JOHN: RHODES

Approaching the gateway is a boy bringing water from a fountain outside the city.

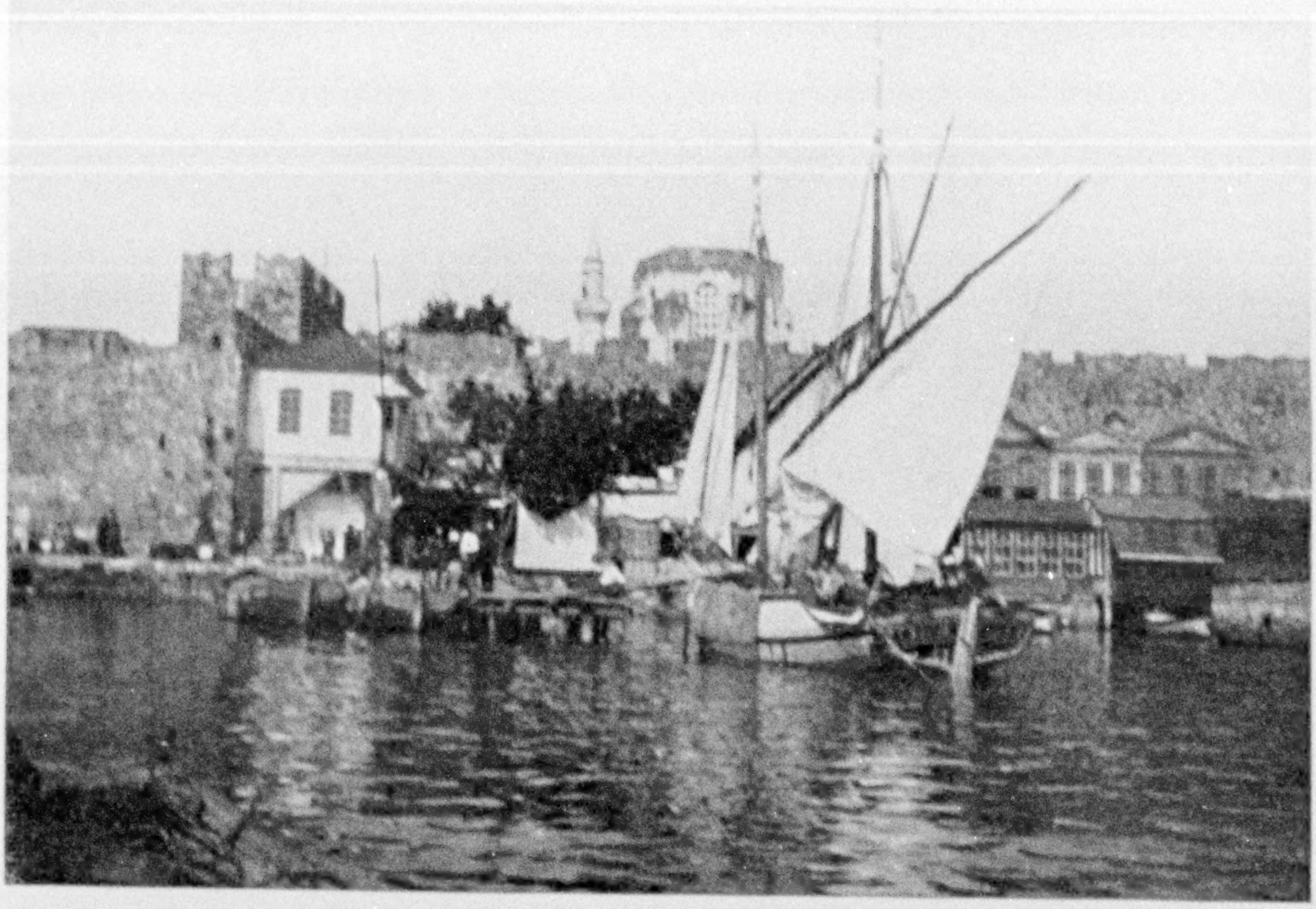
Islands), we caught our first rough weather. "San Giorgio, big Italian saint," the skipper reminded us when, for his benefit, we pretended to search for life-preservers. What with everything running smoothly so far, he had become insufferably boastful about his big Itaiian saint.

However, we took him down a bit when we discovered in an old log book that the vessel had been formerly named the *Hagios Giorgios*, the corresponding patron of his enemies, the Greeks. But her dark past was not entirely revealed until one day we distinguished on the weather-worn taffrail faint traces of lettering that proclaimed her to have been originally the *George T. Smith* of Norfolk, Virginia, Mr. Smith having been thus canonized in two languages.

RHODES A DREAM OF MEDIEVAL CHARM

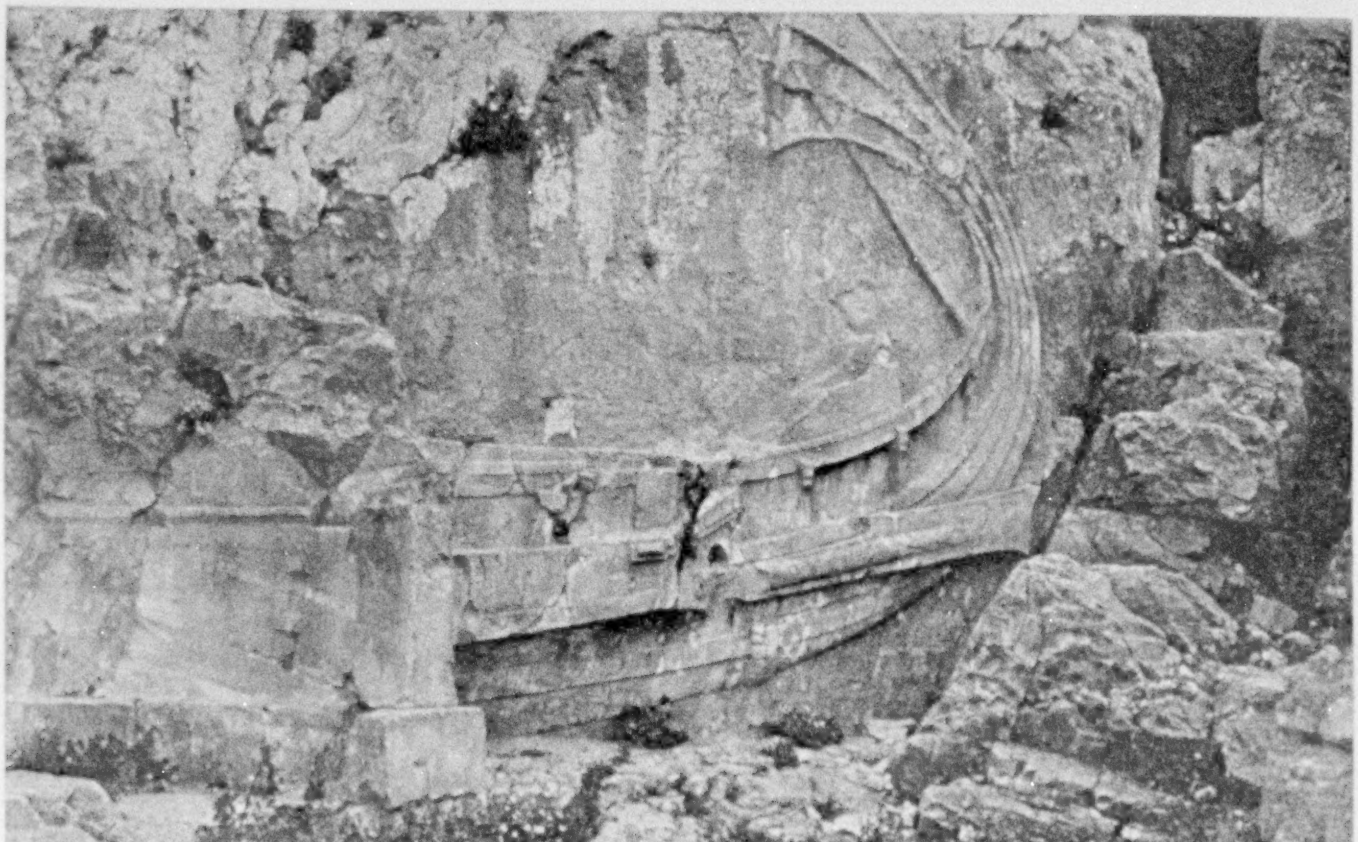
Next morning, as if someone had turned the page in a picture book, Smyrna's commerce-crammed mart had been replaced by that sea-fortress haunt of mailclad medievalism, knightly Rhodes.

Neither books nor photographs can prepare one. Rhodes is a shock of delight. As one is rowed ashore from the ship's side to the island, it is as if someone had rubbed the magic ring. To-day's business fades out and a dream envelops the traveler, a dream of the armored and bannered 15th century.



Photograph by Melville Chater

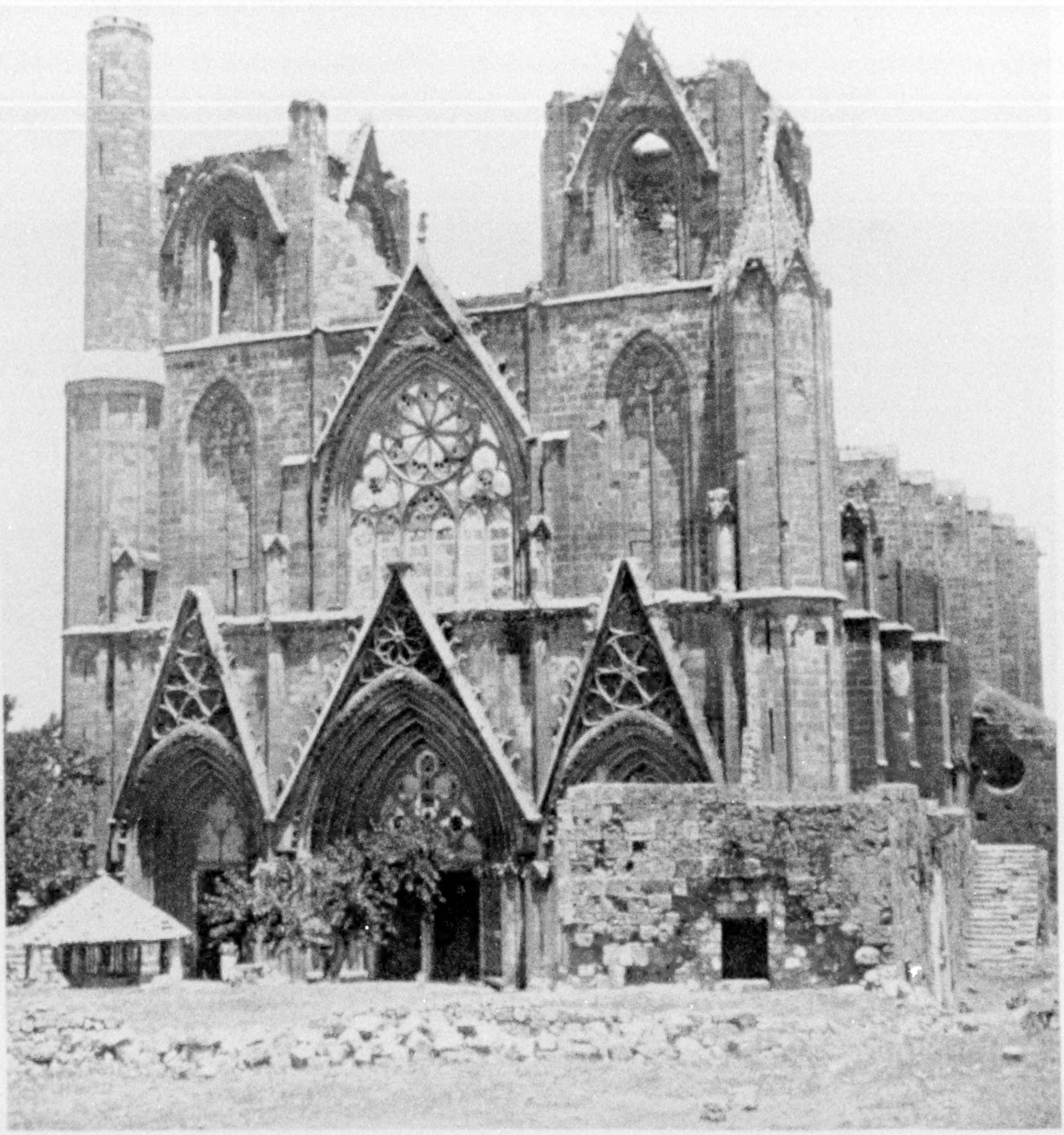
INSIDE THE HARBOR OF RHODES, WITH THE WALLS OF CASTILE IN THE BACKGROUND



Photograph by Theodore Leslie Shear

THE PROW OF A GREEK SHIP SCULPTURED IN THE LIVING ROCK AT LINDOS, ISLAND OF RHODES

This striking relief-carving is to be seen on approaching the citadel of the home city of Chares, the sculptor who created the Colossus of Rhodes (see, also, text, page 664).



Photograph by J. P. Foscolo

THE CHURCH OF ST. SOPHIA IN THE VENETIAN WALLED TOWN OF FAMAGUSTA, ISLAND OF CYPRUS

Acts II and V of Shakespeare's "Othello" are laid in Famagusta, a small seaport on the east coast of Cyprus, a few miles south of the ruins of Salamis, the chief city of the island in ancient times, supposed to have been founded by Teucer after the Trojan War.

Yonder seaward-stretching tongue of rubble surmounted by a round fort is the mole which once sheltered the knights' fleet of galleys and which may have borne, a thousand years earlier, the famous bronze statue of Helios, known as the Colossus, one of the seven wonders of the ancient world.

Earlier still, Rhodes, as a great sea power, framed the first code of maritime law. There was to be profit-sharing between captains and their crews, compensation for the widows of lost mariners, penalties for wreck-plundering. So decreed those forerunners of the bronze Helios. Its very name suggests a heliograph station, and perhaps the mirror which, some writers aver, was set in its chest flashed messages to relaying ships.

Earthquake overthrew the Colossus, and centuries later its remains were igno-

Photograph by Ernest B. Schoedsack

FUEL FOR ADANA

Wood from the foothills of the Taurus Mountains is made into rafts and floated down the Seihun River to the important Anatolian town of Adana, where the traveler finds a castle founded by Harun-al-Rashid, hero of the "Arabian Nights."

miniously auctioned off as 1,000 camel-loads of scrap to a Jewish junk dealer.

NO CHAIN BARS RHODES' HARBOR NOW

Our skiff enters the narrow harbor mouth, flanked by a tower bearing the fleur-de-lis and by the ruined base of what was once the tower of Grand Master de Naillac. But no longer does a stretched chain bar the way. That is in Constantinople as a trophy of one of the various sieges which Rhodes sustained.

Every night the harbor was closed by those massive links, and the merchantman who arrived too late was ordered by the captain of the Three Towers to anchor outside.

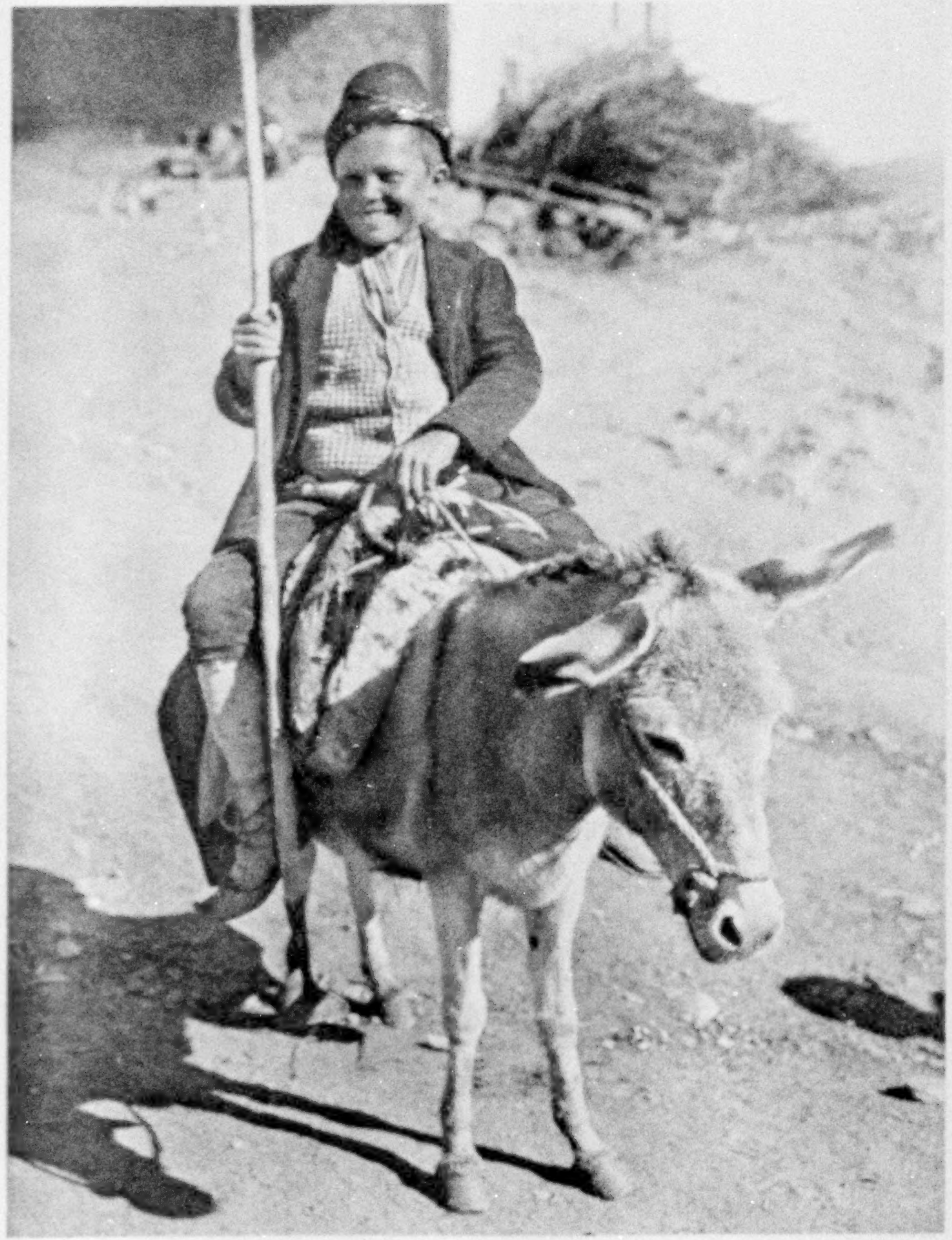
Those three windmills on the mole alone remain of the many which the Rhodian churches owned and operated for profit. The windmill of the Virgin, the windmill of St. Catherine, and others, must have been rich sources of revenue, especially whenever a siege was expected; for then the Grand Master of the Knights Hospitallers of St. John of Jerusalem commandeered the entire island's grain, its oil and wine, storing away a year's provision for his six hundred knights and for the civilian hosts that eagerly sought refuge within the mighty fortifications.

The Rhodian burghers waxed rich by the presence of this deep-pursed order, so nobody grumbled against its military regulation which prohibited the exportation of foodstuffs and horses.

They were young, these Knights of St. John, aspirants being admitted on probation at the age of fourteen and receiving full privileges four years later; but whether classed as full knight, chaplain, or serving brother (*i. e.*, fighting esquire), a man rarely outlasted the hazardous life beyond forty years of age. It was indeed a League of Youth, vowed under papal sanction to poverty and chastity, to the succor of pilgrims, and to the defense of the Holy Sepulcher. Throughout Europe the order spread its religious-military appeal, recruiting celebrities and attracting wealth.

A CITY WHOSE WALLS HAVE TONGUES

All around us, as we debarked on the sunny, sail-flecked quay, rose gigantic



A YOUNG TURKISH PEASANT

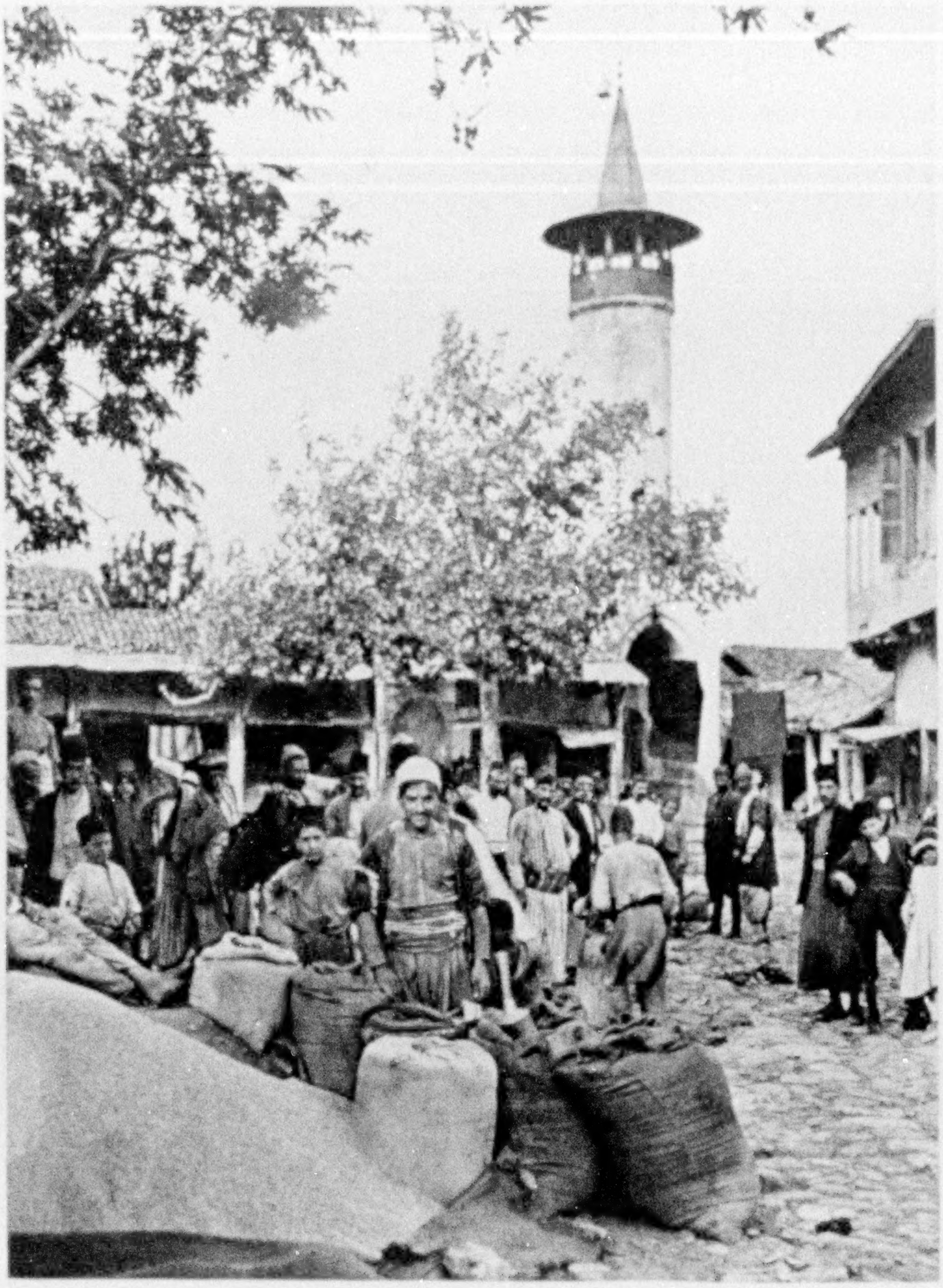
A WANDERING TURKISH MINSTREL

Photographs by Ernest B. Schoedsack

Photograph by Gabriel Bretocq

MODERN ANTIOCH FROM ACROSS THE ORONTES (SEE TEXT, PAGE 675)

The ancient city extended along both banks of this river, which was crossed by five bridges. To-day only one, of Roman origin, remains. There still exist interesting traces of the imposing fortifications, which consisted of high walls topped by 300 towers. The hippodrome at Antioch was supposed to have been the scene of the famous chariot race in General Lew Wallace's "Ben Hur."



Photograph by Gabriel Bretocq

THE GRAIN MARKET OF ANTIOCH

Picturesque features of many of the streets of the city are the vine branches running from one shop to another, shading the passer-by and giving a continual gala appearance to the thoroughfares.

battle cries shouted in the eight tongues, each from its appointed post, besieged by Islam's ghostly multitudes.

Four times, under the knights, Rhodes stood siege. When the Turks made their second attack, they arrived with 109 ships and 70,000 men, employed lighted arrows and floating bridges and prepared eight thousand stakes for impaling the defenders. They lost one-third of their army. But in 1522, six hundred knights and a mere handful of soldiers, after maintaining an unparalleled defense of the stronghold for six months, against a fleet of 300 ships and nearly a quarter of a million Turks, capitulated on honorable terms.

Rhodes to-day presents the aspect of a huge medieval fortress whose keeps, magazines — yes, its very dungeons—have been remodeled into quaint shops and dwellings. At the call of the food-peddler, housewives let down baskets on strings from upper windows where the knights' prisoners once peered forth from behind bars. The town pasture lies within the ramparts which once inclosed the Grand Master's palace, and here sheep nibble among mounds of the stone cannon balls which were flung into the city by Turkish bombards.

Sponges from Kos are piled in the knights' parade ground; acres of vegetable gardens, making green the once-grim moats, spring from the mingled dust of Christian and infidel who fell there, while around the massive barbicans, slit with

walls, swallow-tailed along the top, circling the huddled town. "Walls have ears," but Rhodes' walls have tongues, as the eight-tongued cross of the order, later called the Maltese cross, signifies. Knights from eight Christian kingdoms to fight the unbeliever—to each kingdom a tongue and to each tongue a post on Rhodes' walls—such was the organization of the order.

As one circles the ramparts, now estimating the breadth of a 40-yard ditch, now deciphering the heraldic devices on shields carved in the stone, none but the deafest ears could miss faint echoes of

Photograph by Gabriel Bretocq

THE AQUEDUCT OF DAPHNE: ANTIOCH

The Roman emperors Caligula, Trajan, and Hadrian built aqueducts to supply Antioch the Glorious with excellent water. In many places one of these aqueducts now serves as a bridge, and caravans pass over its arches, which are adorned with the stalactites formed by the dripping water.

cruciform loopholes, cluster masses of pomegranate and oleander blossoms.

A TOWN RICH IN MEMORIES

Here and there, against the ever-present background of brown fortifications, rise lancelike minarets. In cobbled courtyards are Rhodian women at their washboards, men at carpenter's or cobbler's bench, dark-eyed children shouldering water jugs, the picture being framed by some massive buttress connecting two medieval hospices. Yonder is a housewife preparing the noonday spaghetti inside a Gothic doorway over which is carved a row of knightly shields.

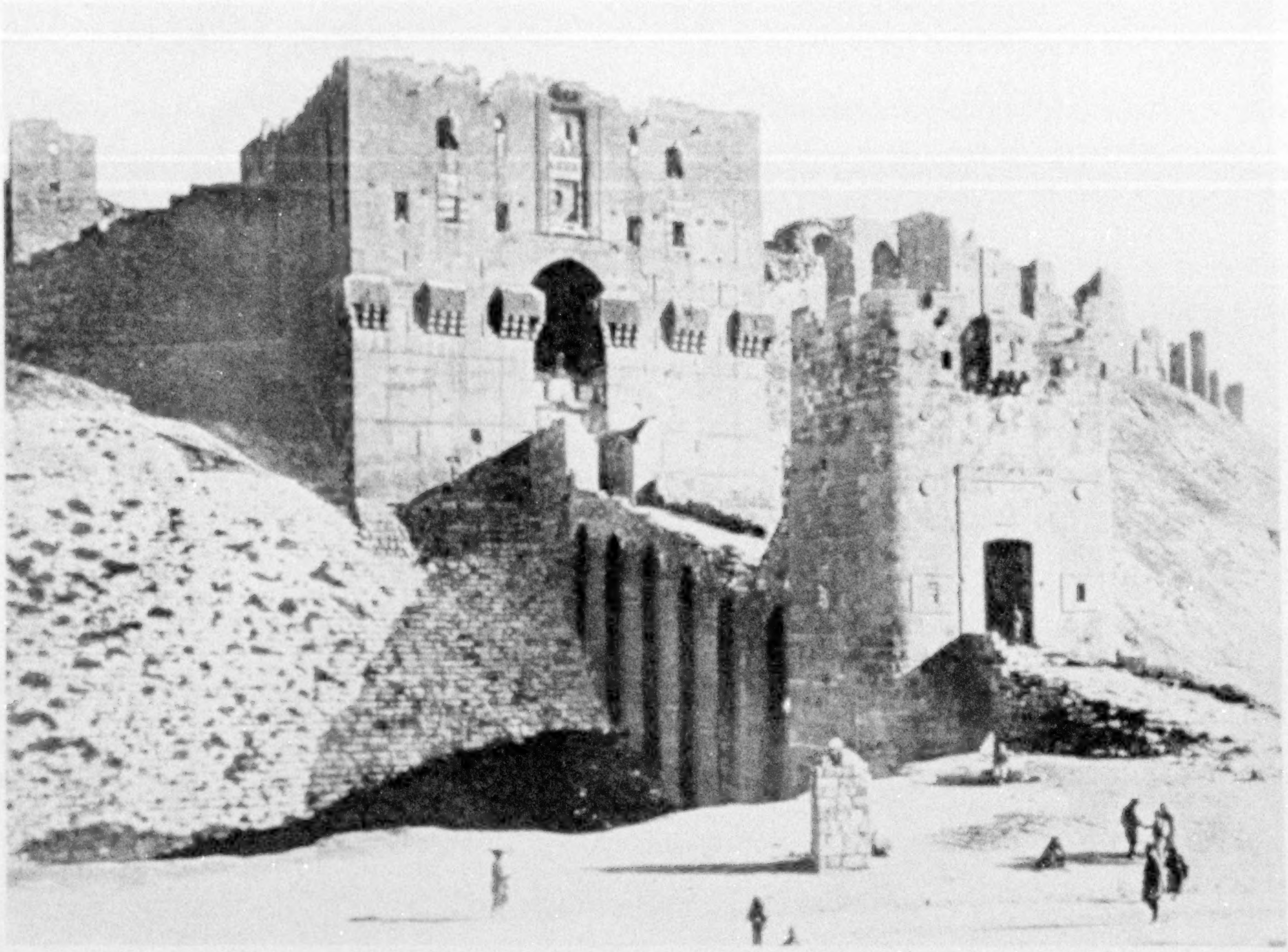
The women's street costume includes a curious black bonnet with two long, black ribbons streaming down behind. The men go about in scarlet-and-gold waistcoats and in baggy trousers whose sacklike seat hangs almost to the heels of their Rhodian boots.

Golden brown, under a turquoise sky, lies the Street of the Knights (see page 661) where the spittings of many gargoyles have worn a trench along the stone pavement.

In this street, on the eve of some expected siege, a grand review took place. Genoese and Venetian mercenaries, clad in purple, green, and gold, swung past the Grand Commander, shouting for the kingdom of Christ and for their respective republics. The mailclad knights, in red surcoats bearing the Maltese cross, curvetted their pawing chargers under the fluttering banners of the Eight Tongues, and red roses, the flower for which Rhodes was named, were thrown by fair hands from balconies hung with Turkey carpets and Flanders tapestries.

THE KNIGHTS DISLODGED ON CHRISTMAS DAY

Past the Grand Master, too, were borne the order's holy relics; the right hand of its patron, John the Baptist, a yearly budding fragment of the Crown of Thorns, a copper cross made of the bowl from which the Savior washed His Apostles' feet. One thinks of King Arthur's



Photograph by Gabriel Bretocq

THE CITADEL OF ALEPPO

Long before Antioch sprang into existence Aleppo was known to the ancient Egyptians as a thriving trade center (see text, page 678).

knights and of their quest of the Holy Grail.

Of all humiliations, it was Christmas Day, 1522, which beheld the yelling inrush of loot-maddened Turks. A week later de l'Isle d'Adam and his shattered knights evacuated, bound for the barren island of Malta.

As into the yawning shell of some vanished mollusk lesser beings creep for shelter, so Rhodes of to-day shows itself puny within the vast, embracing walls. And as from the shell we know the long-dead creature, so those stalwart, sea-surrounded fortifications still breathe of mighty heroisms, of mystic self-dedications, of that lost romance which beckons through "magic casements opening on the foam."

We would gladly have vowed a candle or so to San Giorgio (or George Smith) for the sending of sufficient freight to keep us at Rhodes for a week. But nothing offered, either there or at Kemalist-held Adalia; so we paid a flying visit to Cyprus, then steered northward, anchoring in the Gulf of Alexandretta.

War has so reshuffled governments in the Near East that in touching at seven Asia Minor ports we had been under five different régimes—British, French, Italian, Turkish, and Greek.

STILL SEEKING THE LEVANT

Our party decided to turn inland and southward, through Syria.* As we left the *San Giorgio* shoreward-bound in a caïque, one of us called to the skipper, "Where do you go from here?"

"The Levant!" he called back, with a southward sweep of the arm. And we laughed. Apparently the Levant lay in the same latitude and longitude as the well-known foot of the rainbow.

Near by, a big Italian liner was discharging its native passengers into small

* See, also, "Syria, the Land Link of History's Chain," by Maynard Owen Williams, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1919.

Photograph by Parker W. Buhrman

A VEGETABLE MERCHANT OF ALEPPO OFFERS CAULIFLOWERS FOR SALE

boats, amid that confusion with which Eastern peoples invest anything approaching mass action. Screaming about everything and nothing, clutching at one another across tippy gunwales—gentlemen almost losing their hats by reason of too wildly waved umbrellas, ladies with disarrayed face veils imploring that their babies be not left behind—the debarkees swarmed into the skiffs, while from the liner's upper deck other Orientals hurled their departing friends' baled bedding into their midst, Allah's outstretched hand alone averting casualties.

From aboard the liner an American voice was heard to remark:

"Need a couple o' Irish cops, they do. Ain't they the prize boat rockers?"

A white, sun-smitten town backed by green hills and peopled by fever-yellowed natives—such was the color scheme afforded by our first glimpse of northern Syria. We found the adjacent marshes occupied by some tens of thousands of Armenians, who in an hour of political insecurity had trekked from far inland with the timber of their pulled-down houses, setting this up afresh and wattling it with the surrounding reeds into a mushroom town which should have been called Malariaville.

"What are these refugees living on?" asked a British journalist who had just landed from the liner. The mayor of Malariaville, whom he had addressed, replied:

"Mice."

"What?" The journalist pulled out his pencil. "*What* do they eat?"

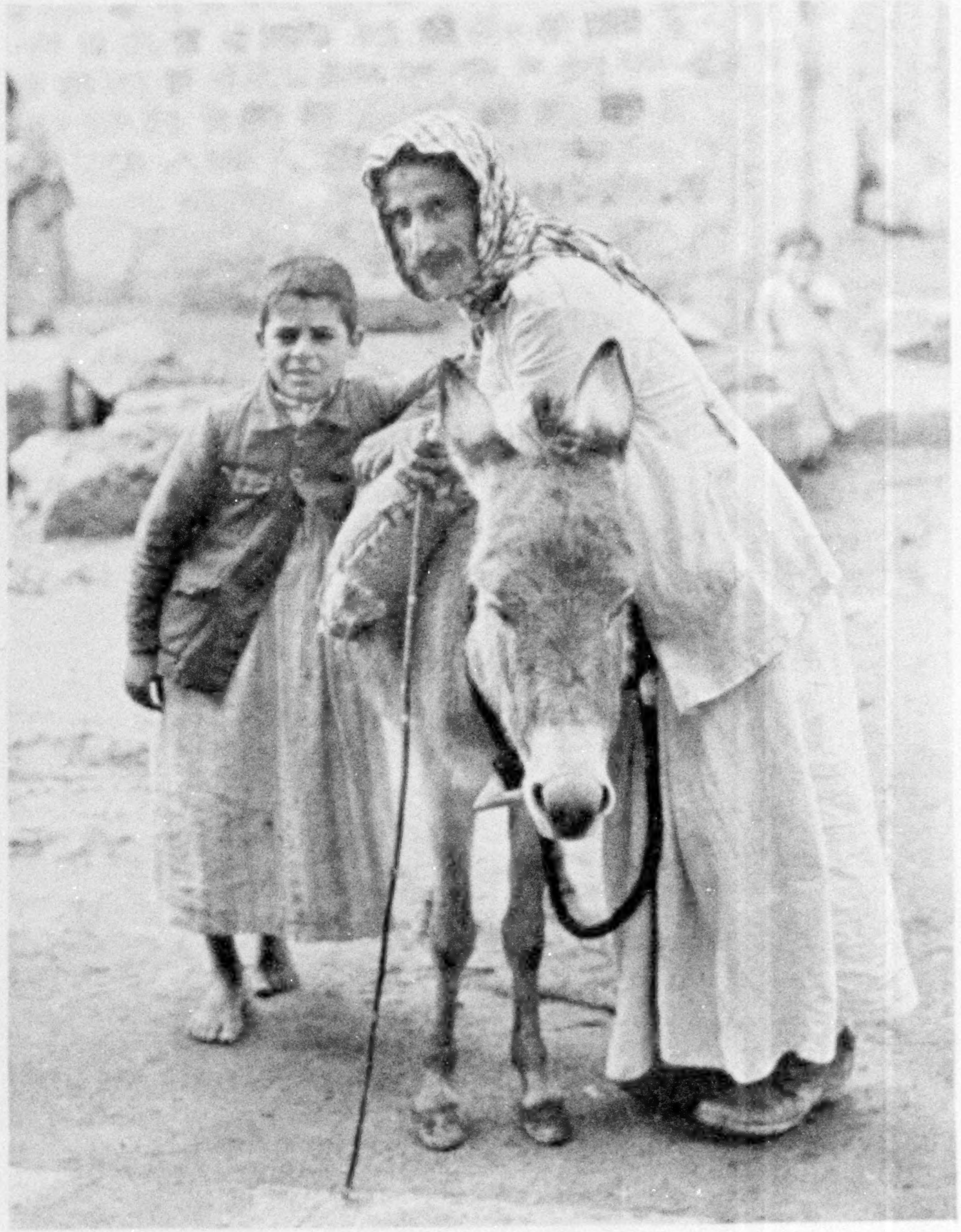
"Mice," repeated the mayor cheerily, "boiled mice."

But just then, unfortunately for the journalist's famine story, the mayor's wife showed us what she was carrying in her apron—a few handfuls of yellow, ground corn.

"*Maize!*" we chorused.

"Yes, sars," amiably responded the mayor, making an extra effort in his broken English, "that's what I said—*m-a-a-ice!*"

As we afterward found, grain boiled, then dried in the sun, then reboiled in butter or oil, forms as staple a food in



Photographs by Maynard Owen Williams

A SLAVE TO EQUINE FASHION

The Syrian practice of decorating a donkey with beads, bracelets, and other gewgaws makes the life of this burden-bearer on the Beirut-Tripoli road a double burden.

MOSLEMS OF LATAKIA

Like Tripoli, Latakia still carries on Phœnicia's trading tradition, its chief export being the famous tobacco which bears its name and which is used extensively for flavoring less valuable varieties.

Photograph by Melville Chater

OVERLOOKING THE FIELD OF EXCAVATIONS AT JERABLUS, ON THE BANKS OF THE EUPHRATES

For a thousand years the Hittites were a powerful people in the Near East, but this once mighty race is still a puzzle to archeologists, and not until the mystery of the carvings to be found in these ruins has been solved will the modern world know the history of the "Hittim" of Bible times (see text, page 684).

Photograph by Melville Chater

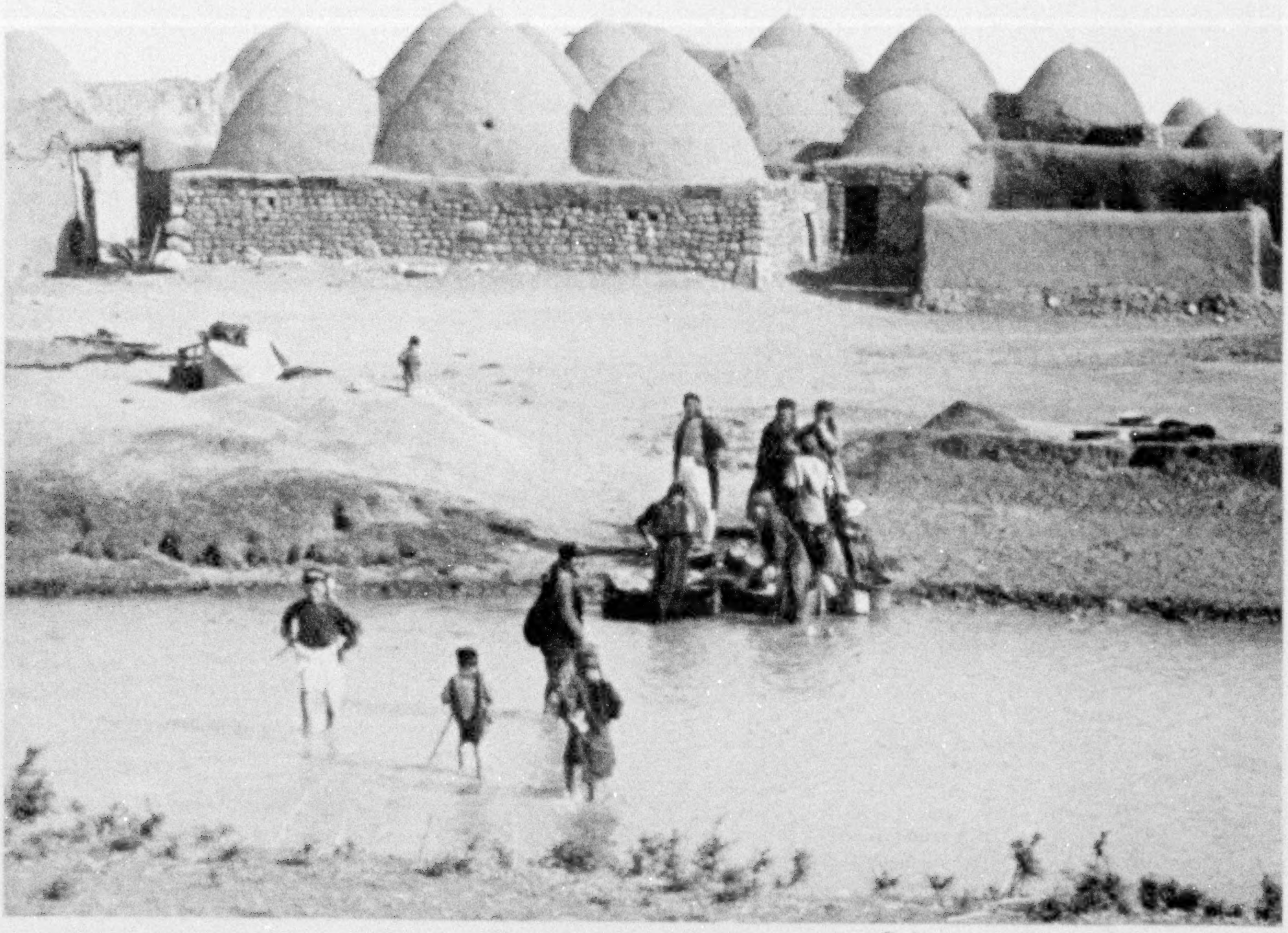
BAS-RELIEFS SHOWING HITTITE INFANTRY ON THE MARCH

The slabs of alternate black (basalt) and white (limestone) display a strange procession of long-robed priests, soldiers, musicians, and slaves. The infantry figures are armed with spears and carry circular shields (see text, page 682).

Photograph by Gabriel Bretocq

A HITTITE PEDESTAL UNEARTHED AT CARCHEMISH

On the right bank of the Euphrates, at the point where it is crossed by the famous "Berlin to Bagdad" Railroad, are the ruins of Carchemish, the principal city of the Hittites.



© American Colony Photographers

A KURDISH BEEHIVE VILLAGE IN THE ORONTES PLAIN NORTH OF HAMÂ

Contrary to expectation, the interiors of some of these houses are quite clean.

Syria as oatmeal does (or used to) in Scotland.

IN THE SYRIAN CITY OF ANCIENT GREEK KINGS

Over the hills, three or four hours by motor car, lay Antioch, a side trip off the main road to Aleppo. Though warned against brigands, we passed nothing more exciting throughout this French-occupied territory than natives plowing the stone-encumbered soil, and nomads' black goat's-hair tents, in the shadow of which some little brown boys, perfectly nude, were regimenting about in cast-off tin helmets.

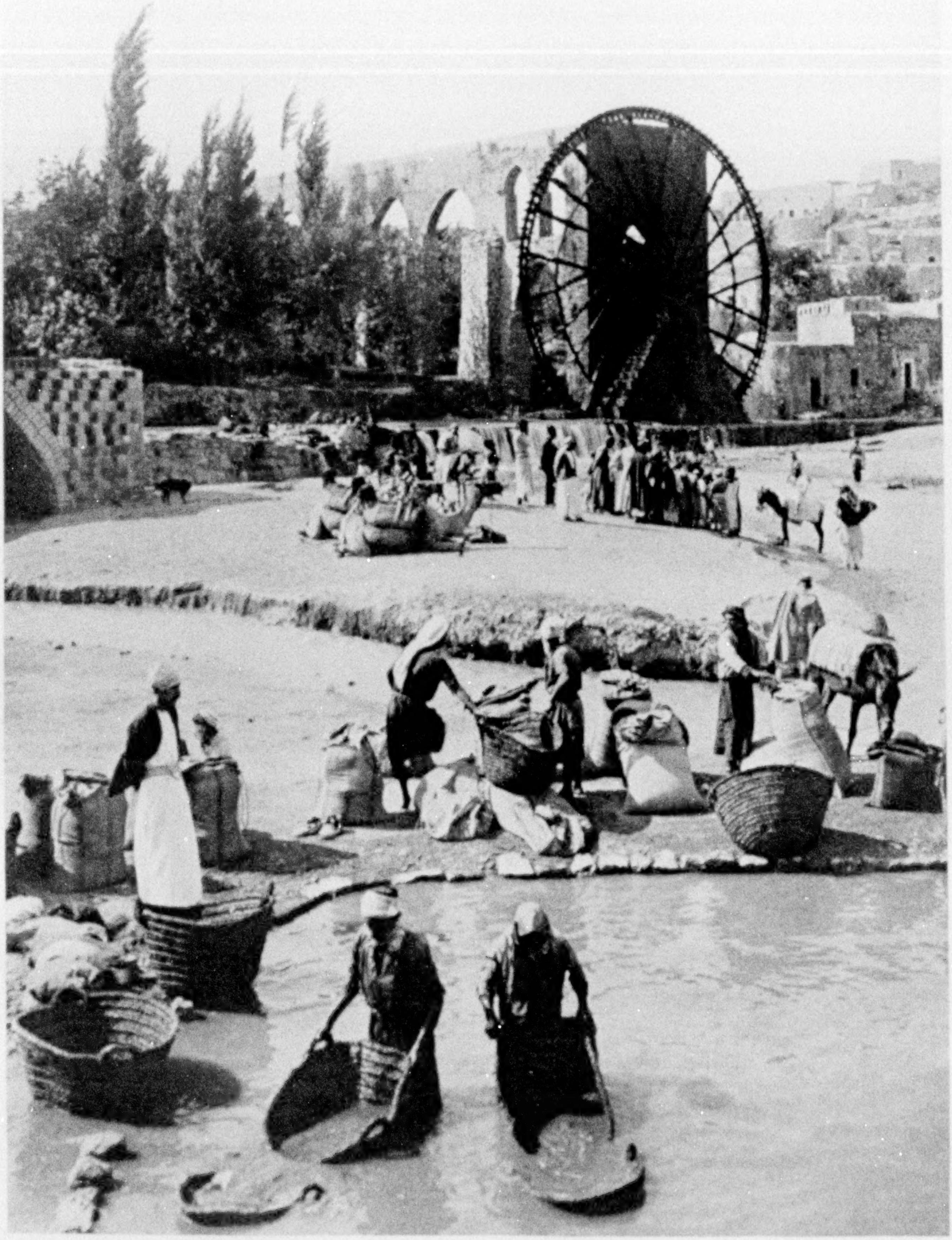
Modern Antioch, prettily set where water wheels along the Orontes River irrigate orchards of pomegranates and apricots, bears no relation to the famous capital of Syria's Greek kings, except in that it nestles under the slopes on which its forerunner once stood. "The Crown of the East," as classic Antioch* was called, is to-day a much-battered diadem, traces of a Roman aqueduct and of a city wall, once wide enough for four-horse chariots to drive along the top, alone remaining of her architectural jewels.

Temples and public baths, theater and amphitheater, senate house and imperial palace—all have followed their architect-kings, the Seleucidæ, into dusty oblivion.

WHERE THE TERM "CHRISTIANS" ORIGINATED

Antioch's living link with the past consists in that there is still a Christian community in the city where members of the new sect were first called Christians. It was here that they first formed themselves

* See, also, "Antioch the Glorious," by William H. Hall, in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1920.



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ONE OF HAMÂ'S MANY GIGANTIC WATER WHEELS, EACH WITH ITS OWN NAME AND SOUND

These lifters of the life-giving water empty their precious burden into a lofty aqueduct, so that a considerable expanse of the Orontes Valley is kept under irrigation. The peasant women in the foreground are washing wheat.

Photograph by Maynard Owen Williams

A "SERVE-YOURSELF" GROCERY SHOP IN LATAKIA, SYRIA

Fresh and pressed dates, oranges, ripe olives, cotton socks and cordage, biscuits (crackers), doughnut-shaped hard-tack hung from the ceiling, are all at hand, everything in its standardized place, so that the casual customer can tell at a glance whether the thing he has come to seek is in stock. The central rope is not for sale, but is the shopkeeper's private elevator.

into a community outside the synagogue; also, it is the city from which St. Paul started on his missionary travels. But were St. Paul to return to Antioch to-day he would never recognize in this drowsy Syrian town that gold-and-marble metropolis whose luxurious citizens must have evoked some of his thunder-and-lightning philippics.

Merely to catalogue ancient Antioch's builders, conquerors, rulers, and religious teachers is to suggest its former grandeur. The list includes the kings of Persia and Armenia, Pompey, Zenobia of Palmyra, Constantine the Great, Julian the Apostate, the Crusaders, and half a dozen Roman emperors who maintained imperial residences there.

The facility with which a Westerner may degenerate under the Orient's spell is proverbial. The Romans succumbed to it at Antioch; and the stalwart Crusaders, having captured part of the city, became too demoralized by it to finish the job. At last, thanks to a salutary earthquake—perhaps nothing less would have roused them—they begirt themselves, invested the city, and instituted a massacre.

A truly edifying moral attaches to the decadent Antiochenes. Possessing a scurrilous wit and the gift of inventing objectionable nicknames, they tried their pleasantries on Chosroes, the invading Persian. But Chosroes couldn't take a joke and promptly destroyed their beautiful city.

Though it was rebuilt, successive earthquakes did their part, and the Antiochenes did theirs by using the débris of imperial edifices to repair their homes. To-day, Antioch, once the objective of armies, is shunned even by the modern army of tourists; for it is not a "genuine antique," being therein like its bazaars'

Photograph by De Cou from Galloway

LOADING A CAMEL AT A WELL NEAR BAALBEK

"Roman" thumb-rings and bracelets, which are too often the work of Aleppine copyists, who excel the centuries in producing fine verdigris effects.

THE CITY OF THE DAPPLED COW

Aleppo, which we reached after six hours of motor-car travel over a fair road through the plain, is Syria's first reminder to the southbound traveler that he is in the land of white-clad Arabs, of the smiting glare of near-by deserts, of Oriental civilization uninterrupted since antiquity.

Indeed, there are Aleppines who will gravely assure you that the city's Arabic name of Haleb-al-Shabba (that is, "the dappled cow has been milked") refers to the fact that Abraham opened a free milk station there in Biblical times. Whether or not this gloss would withstand higher criticism, it is hardly less to be chuckled over than Shakespeare's reference to the good ship *Tiger* sailing for Aleppo, which is something like seventy miles inland.

It is trade centers rather than sumptuous capitals which endure; and Aleppo, known to the ancient Egyptians long before Antioch sprang into existence, has been carrying on her tradition of "business as usual" for certainly four thousand years. A stranger, entering its great bazaar from the street's blinding, sand-colored vistas, can easily lose himself in the cool twilight of those labyrinthine tunnels. It is veritably a walled town within a city, an almost night-black town when, at high noon, the air-holes in the roof are masked against the sun.

Place yourself near an unmasked roof-

hole, through which falls a twenty-foot column of sunlight, cutting the gloom like a plunged sword. For all you can see outside of its area, the bazaar street might be draped in black; but, by ones and twos, figures emerge from the blackness, pass through the shaft of light, and are swallowed up in the blackness beyond. Thus, in cinemalike "close-ups," glaringly illuminated, they flash past, the types of the East.

THE PASSING SHOW IN ALEPPO

Here is a donkey bearing two huge jars and led by a patriarchal figure (it might be the ghost of Abraham dispensing free milk). Two swathed and veiled Moslem women, black, faceless phantoms, who are "window shopping" from booth to booth, appear and vanish.

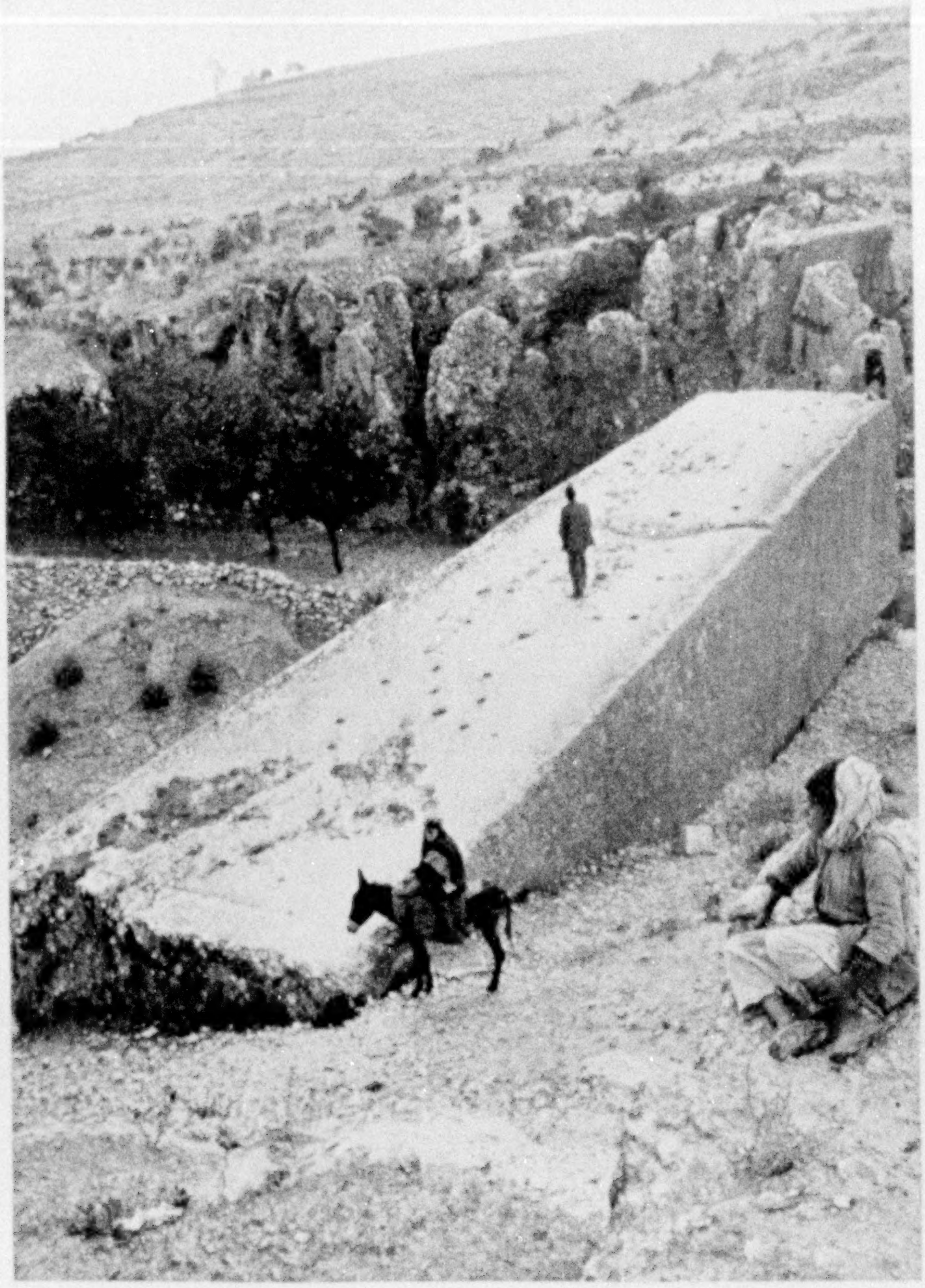
A diminutive bazaar boy, in flapping skirt, bearing tiny cups on a brass salver, darts through the light shaft with complimentary coffee for his master's new customers. A hunchback beggar, clutching together his verminous rags, poses in the glaring circle with outstretched palm. Two turbaned rug fanciers squat there to examine a Persian weave, and momentarily the light circle blooms into the blues and old-rose shades of the outspread carpet.

A trio of Aleppine dandies, wearing white, tasseled caftans and long-skirted surcoats striped in yellow and black, swagger past, fingering the pommels of their Damascene knives. A bowed, green-turbaned priest, with snowy beard and benign eyes, paces by, the glare illuminating the string of amber beads which hangs from his toying fingers.

And here hobbles a hook-nosed crone who beckons to the smartly uniformed officer at her heels, whereat you remember those words in the old Oriental tale, "Good youth, my mistress hath seen thee and would have speech with thee."

Group by group, these timeless types flit through the light shaft like glowing pages of the Arabian Nights.

A five-hour train crawl through sixty-odd miles of flexured, treeless plain



Photograph by C. Raad

A MAMMOTH STONE SEALED TO ITS QUARRY BED ON ITS SIXTH SIDE: BAALBEK

Bajar-el-Hubla ("Stone of the Pregnant Woman") is 70 feet long, 14 feet high, 13 feet wide, and is estimated to weigh 1,500 tons (see text, page 696).

Photograph by Maynard Owen Williams

IN A SYRIAN SILK FACTORY

The whole region around Beirût is a rich silk-producing center, and several large factories rise above the groves of mulberry trees. Each woman works at a copper bowl of hot water, into which the cocoons are plunged. Several sharp dabs with a brushwood brush like that at the top of the picture loosen the coarse outer covering. Then the tiny strands of silk are reeled off, passing through glass guides on their way to the drums in the background and in the process of being twisted together with from 2 to 6 other strands. Live steam can be let into the bowls from the pipe in the foreground, and beyond the bowl from the worker's right the dead larvæ accumulate.

brought us to the Euphrates. Here, at Jerablus, a mere railway track divided the French and Kemalist territories; so when we expressed to a French officer our wish to visit the excavations of ancient Carchemish, he simply called to a Kemalist sentry who was posted twenty paces away. The soldier crossed the track; then, with us in tow, recrossed it into Kemalist territory.

IN THE LAND OF THE HITTITES

On the same spot, three thousand years ago, the river, instead of the railway track, had served as the Hittites' strategic frontier against Egypt and Assyria; and Carchemish, just ahead of us on the Euphrates' bank, had been for two centuries the Hittite capital.

The city site of 2000 B. C. and the military trenches of to-day lay within eyeshot of each other, as we gained the Turkish outpost, where a few soldiers were dozing in a stable courtyard.

Obviously the excavations had contributed to their comfort and patriotism. Two stone blocks inscribed with the still-baffling Hittite characters formed their cookstove, while over their doorway stood a Hittite slab carved with a winged orb, the crescent outlined within its full disk being probably hailed by them as indisputable evidence that Turkey had existed since time immemorial.

Beyond question, the Hittite palace and slab-walled avenue which have been unearthed mark the site of the city which is referred to in the Bible as Carchemish and in Babylonian and Assyrian records as Karkamishu or Kargamis.

Our soldier guide led us across a plain, dotted with lonely corner stones and monoliths, in the direction of a hill which bordered on the mud-brown Euphrates.

THE WAY A SYRIAN SHOVEL IS WORKED

Sometimes one man pushes the shovel and another pulls a rope attached to the handle just above the blade, but more frequently two haul while one pushes.

Photographs by Maynard Owen Williams

MAKING MOUNTAIN BREAD AT DEIR EL-KAL'A, NEAR BEIRÛT

The finished product, sometimes almost as thin as paper, is seen piled up to the right. Under a curved iron plate, with the convex side up, a small fire of dried twigs bakes or dry-fries the bread in less than a minute.

Photograph by Maynard Owen Williams

TOILERS BY THE SEA, ON THE BEIRÛT-SIDON ROAD

Tradition says that it was near this spot that the great fish cast Jonah out upon the dry land.

This partly excavated acropolis revealed a mutilated Greco-Roman temple overlooking the river; but our absorbing interest lay in the Hittite capital's "Main Street," a slab-bordered avenue leading into a square from which, between slab-built walls, stone steps ascended to the rubble-strewn foundation of the palace of the Hittite kings.

The Main Street slabs, alternately black (basalt) and white (limestone), might be described as a triumphal-entry series. They displayed a strange procession of long-robed priests, soldiers, musicians, and slaves. The slaves, clad in a kind of Highland kilt, bore sacrificial kids; and the Hittite infantry, armed with spear, circular shield, and conical casque, wore footgear with tip-tilted toes, precisely as did our Kemalist soldier-guide (see p. 674).

A turn in the street brought us to a second series of slabs. Here were rampant lions with birds' heads and wings, eagle-headed and leopard-headed deities, and a bicephalous sphinx combining the craniums of man and lion. So diverse was the display of animals that it seemed as if the Hittite kings had sculptured the totems of the many tribes over which they ruled, to create this national pantheon.

Slabs in the adjacent palace wall showed war chariots bearing kings with

Photograph by Maynard Owen Williams

PEASANT WOMEN OF SYRIA, WITH RUFFLED TROUSERS AND PATCHED APRONS

They dwell in the land known to the ancients as Phœnicia, a maritime nation which, a thousand years before the Christian Era, sent its ships and colonies throughout the Mediterranean and beyond the Pillars of Hercules, even to the Scilly Isles, off the southwest coast of England.

Photograph by Maynard Owen Williams

A MULE LOAD OF PINE BRANCHES

This fuel is used in the bakeries of Beirût and wherever there is need for a quick, hot fire.

drawn bows, reminding us that by the twentieth century B. C. the horse had appeared in Asia Minor.

On a near-by pedestal stood two bulls, emerging in Rodinesque manner from a single block of stone, which was hollowed between their backs so as to form what we took to be a sacrificial altar. Opposite, two upright beasts were holding aloft between them something which resembled a lotus bud.

STONE CARVINGS ARE UNDECIPHERABLE

But it is to the triumphal-entry series that one's teased imagination always returns. What is the meaning of those mysterious figures, defiling in mute, eternal procession along the way of kings? In their time many a western nation's penned or printed archives have perished, yet still they shadow forth their dark story, like silhouettes passing behind a screen.

The Greeks placed their joyous friezes high in air, for the eye's ecstasy; but these grimly profiled figures cling gnomelike to earth, marching along and grazing shoulders with the visitor. Theirs is not joy, but the aspect of unchanging might. Their kilt is no festal chiton, their syrinx pipes are not of Arcady. They are stern Highlanders, tramping to a wild pibroch of Asian mountains.

Ruthless were the conquests, savage the loves and hates, bloody the sacrifices of their 1000-year march through time. It is a blood-and-iron companion piece to Keats' "Grecian Urn," this procession of silent figures, frozen in motion, treading their way across the desolate plain.

The costume details of conical casque, tip-tilted shoes, and kilt are characteristic

Photograph by Maynard Owen Williams

ONE OF THE TOWERS OF THE SEA CASTLE AT SIDON (SEE, ALSO, PAGE 692)

The port of Sidon was formerly protected on the north by this 13th-century fort, built on an island which was connected with the mainland by a bridge. Beirût's prosperity has robbed modern Sidon of its commerce, and the former chief city of the Phœnicians now subsists on its gardens rather than on its foreign trade.

RHODES HAD ITS EIGHT TONGUES AND BEIRÛT HAS ITS EIGHT CHRISTIAN BODIES (SEE TEXT, PAGE 721)

In the left foreground is a camel train with a load of building stone obtained from a quarry in the sands a short distance to the south of the city.

Photographs by Maynard Owen Williams

THE SOUTH LINE OF THE REMARKABLE SEA WALL OF PHŒNICIAN ARADUS, NOW RUÂD

The shore line of this small island, lying less than two miles from the mainland and about halfway between Latakia and Tripoli, was cut away, so that the megalithic blocks rose directly from the sea, leaving no place for a landing between the base and the water. The huge blocks were often quarried only a few feet back of the place to which they were lifted, and a moat was thus formed behind them. The inner shore, protected by this artificial reef and wall, is now lined with windmills.

Photographs by Maynard Owen Williams

DAUGHTERS OF THE LEVANT: SYRIA

Photograph by Maynard Owen Williams

THE PIGEON ROCKS AT BEIRÛT

These two masses have been detached from the headland by the waves, and a mighty battle of the elements is still being waged. Every storm tears away at the stratified limestone. Caves are bored, narrow tongues of land whittled down, and sometimes huge rocks are tumbled to the sea. "During my years in Beirût," writes Mr. Williams, who made this photograph, "I saw several natural bridges of rock near the sea torn away. From one such adventure I came back with both knees gone from my trousers, my camera full of water, and my plates ruined." Note the two men standing on the cliff at the extreme right.

of the Hittite rock sculptures which are found among the Taurus and Anti-Taurus Mountains as far north as the vicinity of Angora. If Ezekiel's apostrophe to Jerusalem, "Thy mother (was) an Hittite," be taken at face value, it seems that the empire of the Hittim extended north and south for certainly six hundred miles.

The Hittites' period covers about one thousand years. During the fourteenth century B. C., established at their capital of Boghaz Keui, in Asia Minor, they conquered northern Mesopotamia, reduced northern Syria to vassalage, built palaces in three or four cities, and laid "the price of peace" on such neighboring peoples as the Amorites at so many gold shekels per year.

HITTITE DAUGHTERS-IN-LAW UNPOPULAR

Carchemish contributed troops to the Hittite army, which, when it fought the great battle of Kadesh against the invading Pharaoh, was so large that it was compared to a locust swarm. Later the Hittites made a treaty with Egypt, and further strengthened themselves against Assyria when one of their kings visited

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GIANT CEDARS OF LEBANON

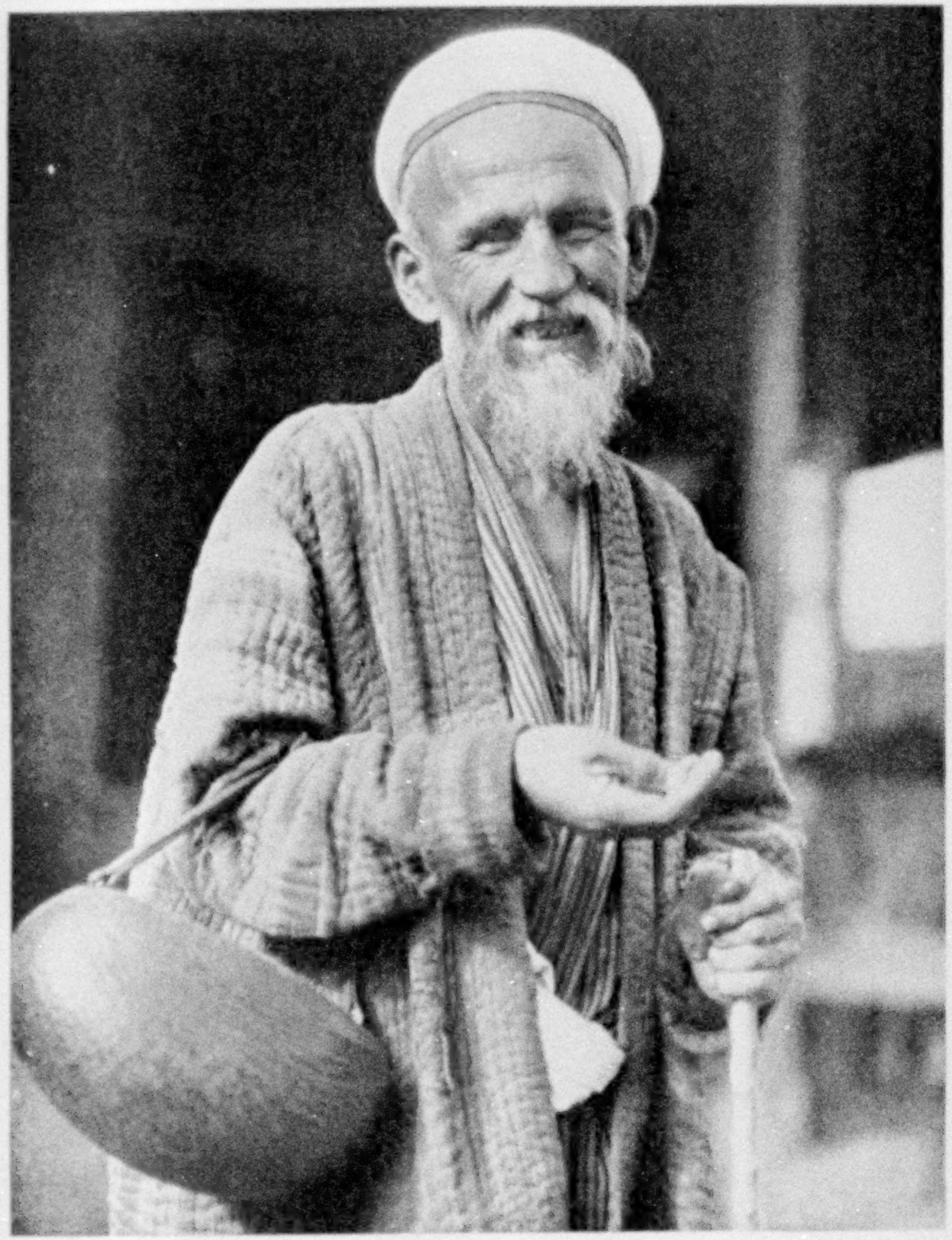
From such monarchs of the mountains Hiram, King of Tyre, hewed the timbers required by Solomon to erect the Temple in Jerusalem.

the reigning Pharaoh and gave him his daughter to wife.

Abraham found the Hittim established in Canaan, where the patriarch, being newly widowed and a stranger in the land, was presented with a burial plot. Esau married two Hittite women, and the domestic complication of a Jewish mother-in-law with two alien daughters-in-law is amusingly disclosed. "I am weary of my life because of the daughters of Heth!" wailed Rebekah, adding that, if Jacob brought another one of them into the family, life would cease to be worth living.

Joshua's land grant comprised "this Lebanon, even unto . . . Euphrates, all the land of the Hittites." But while locally subdued and assimilated under Israel, the Hittim remained independent and powerful in the north. The northern kingdom flourished for a few more centuries, then faded out as a result of repeated invasion by the crescent power of Assyria. In 717 B. C. Sargon captured Carchemish and his troops swept over Asia Minor.

Certain figures in their rock carvings have suggested the theory that their



Photographs by Maynard Owen Williams

A BEGGAR OF BEIRÛT

His begging bowl suggests that he may have come from south of the Pamirs, but his padded robe suggests the tundra region of central Asia.

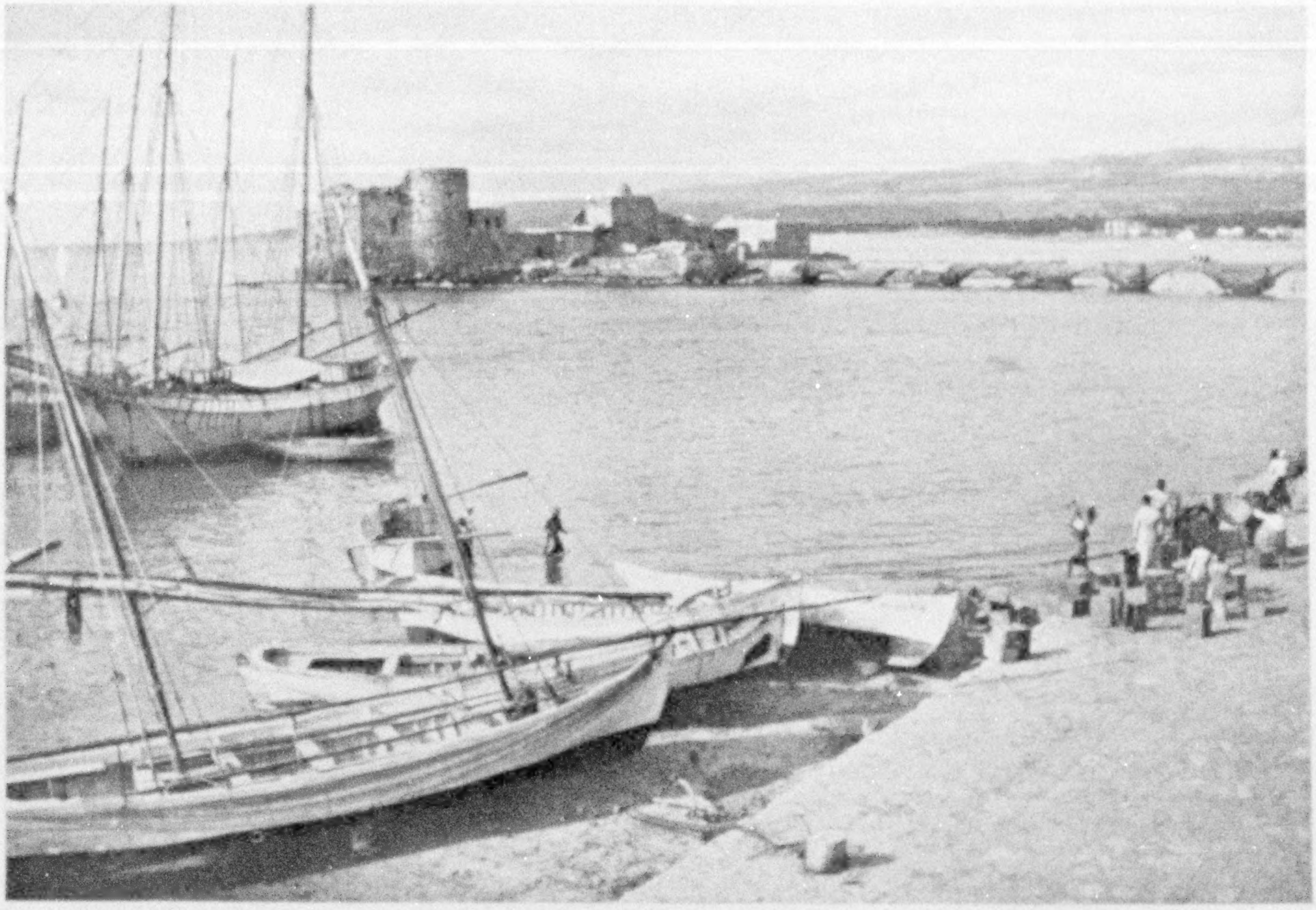
A SYRIAN BREAD BAKER

Her home is the Khan en-Nebi Yûnus, in the village of El-Jiya, between Sidon and Beirût.

Photograph by Maynard Owen Williams

THE HARBOR OF JEBEIL, FAMOUS IN PHŒNICIAN TIMES FOR ITS STONECUTTERS AND SHIPBUILDERS

Much of the produce here shipped is stored in caves near the pier. In the center a group of men is pulling a boat up out of reach of the storm, which broke soon after this view was taken. The tiny port once boasted a colonnade, if one is to judge from the columns in the foreground.



Photograph by Melville Chater

DIM RELICS OF A GLORY LONG DEPARTED (SEE, ALSO, PAGE 685)

Sidon's harbor, where once proud fleets of Phœnician galleys rode at anchor, now shelters only humble fishing craft. The ruined fortifications on the islet in the background date from the Middle Ages, when Saracen and Crusader were matching strength along the Syrian shore.

women were the redoubtable Amazons of Greek legend. Other carvings reveal their worship of a Zeuslike lightning god who was symbolized by the bull, and of the nature mother, Ma, to whom was dedicated the lioness or panther. Attempts have been made to relate the Hittites racially to the Turkomans, but their origin must remain a riddle until their inscriptions at Carchemish, Boghaz Keui, and elsewhere are deciphered.

That one has merely crossed the threshold of a once-mighty race now all but obliterated in mystery is the lasting impression which one carries from those grimly sculptured processional figures at Jerablus.

VAST STRETCHES OF NOTHING IN PARTICULAR

Such a mass of tradition has accumulated around Syria and Palestine that one is apt to expect his trip through those countries to be one of continuous interest. To say that they contain great barren stretches of nothing in particular, interspersed with oases of absorbing charm, would be much nearer to fact.

Thus, in an entire day of 223 miles of railway travel from Aleppo southward, we saw little except treeless, sun-scorched plains containing but two considerable towns, with here and there a Kurdish "beehive" village whose unpartitioned mud huts, set closely together, resembled a cluster of large, brown bowling pins.

It was a relief to the eye, upon nearing Hamâ, to find that flat-roofed, mud-walled town lying in a stripe of dark-green verdure between the dust-brown slopes, the Orontes River snaking past some great water wheels, at their ceaseless work of irrigation. Such a friend is the water-bearer in Syria that, like desert springs, each of these wheels is dignified by its own name (see page 676).

Black minarets of basalt lifted into view, marking Homs, at which station our train halted, so that everyone could enjoy a fifteen-minute smoke; or so we judged by the presence of various small boys, who ran along the platform, carrying

Photograph by Maynard Owen Williams

THREE ERAS OF HISTORIC JEBEIL ILLUSTRATED IN STONE

The story of this city's importance in Phœnician times is read in the sarcophagi which are to be found in the pits, from 15 to 40 feet deep, in the foreground; the columns in the middle distance probably belong to the period when the city was beautified by the Greeks as Byblus, and the square tower at the upper right is supposedly a stronghold built by the Crusaders on Phœnician foundations.

Photograph by Maynard Owen Williams

THE PHŒNICIAN CULT OF BAALTIS PERPETUATED IN STONE

This curious rock carving, high in the Lebanon Mountains, between Ghazir (north of Beirût) and the Valley of Nahr Ibrahim, represents Tammuz (the Syrian Adonis) fighting the boar which mortally wounded him. In the plaque at the right is the Syrian Venus (see text, page 721). The man in the picture, Simon Eastfan, was born in a house near this obscure carving and has worked in Akron and other American cities.

lighted calabash pipes and shrieking in Arabic, "Get your nargiles before the train starts!"

Brown fingers beckoned from train windows, and pipes were handed aboard to patriarchal Arabs, who thereupon sank back to puff away, their eyes half closed, for a blissful session of that half doze which the Turks call *kief*.

WHERE THE BEDOUIN BANDIT THRIVES

There followed dreary wastes of sunburned plain, scattered with jagged rocks—a barren belt which mysteriously sustains the shaggy goats and their savage-faced masters, who squat about isolated black tents—on either hand the curved breasts of the Lebanon and Anti-Lebanon hills, blue and flat, like pasteboard cut-outs ranged along the turquoise sky.

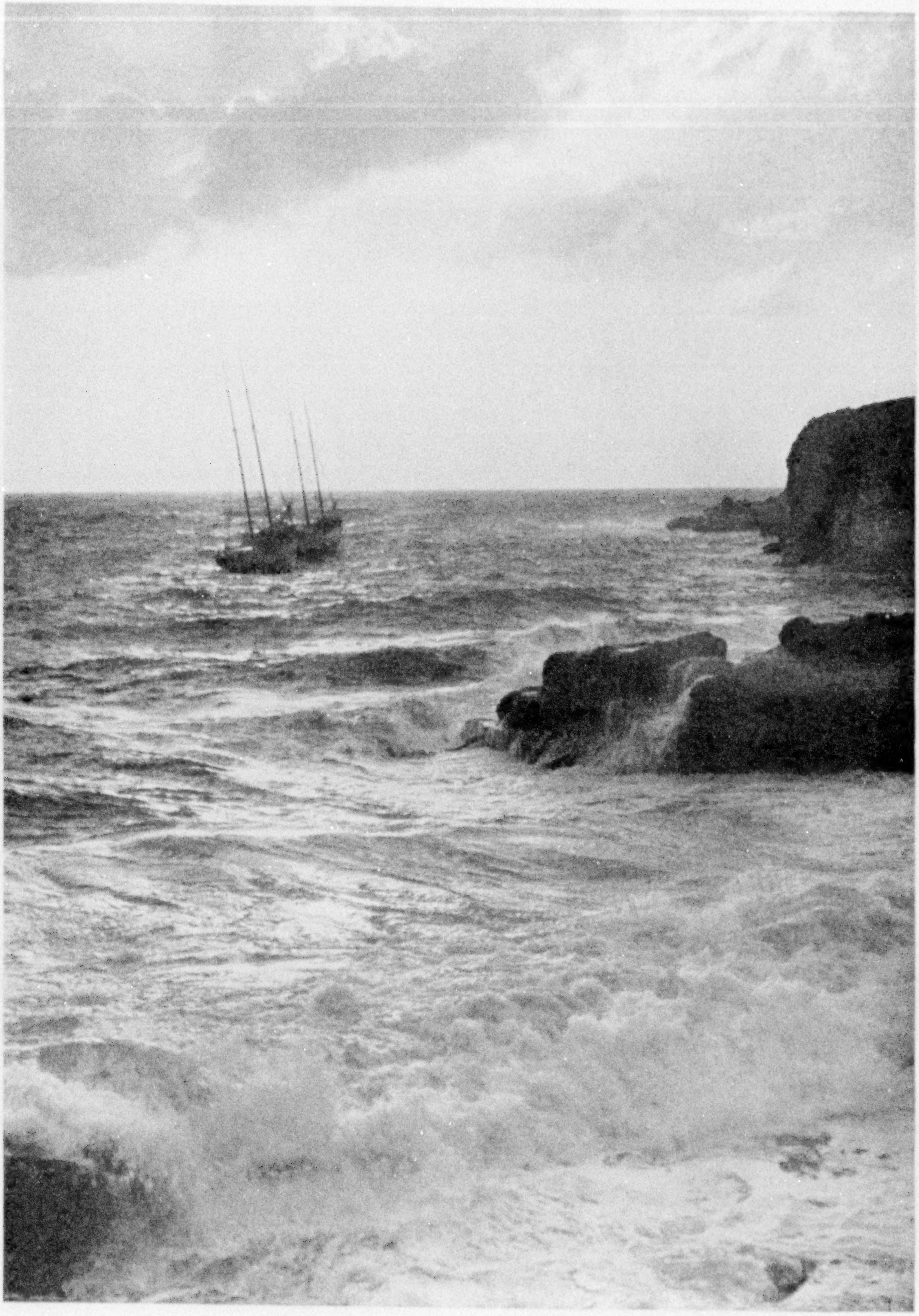
"No wonder the Arabs are *kief*-hounds," said one American, breaking the train's monotonous drone. "I'd call it the land of nothing-doing."

"It is—until you start something," corrected another, "and then it wakes up like a poked hornets' nest. I won't forget what this peaceful stretch of country looked like a few years ago."

He was referring to the Feisalist uprising, at which time, cut off at Homs, he had been forced to adopt Bedouin costume and join a camel caravan bearing Feisalist wounded in order to escape from an orgy of Moslem fanaticism.

During a forty-eight hours' trek across the desert his companions, who turned out to be Bedouin bandits, robbed fleeing civilians, murdered one another over the spoil, constituted him as its guardian, armed him to the teeth, and finally fled at the sight of French troops, leaving the American who had turned Bedouin to enter Damascus at the head of the loot-bearing camel-train with the unenviable job of proving his identity to the French authorities.

And now the sunset, flooding the barren land, fused the Lebanon into mounds



Photograph by Maynard Owen Williams

BETWEEN THE CAPES OF THE SYRIAN COAST ONE FINDS PLEASANT BAYS WITH A SHORE LINE IN A FINE CURVE

There is always a ship or two near the tunneled cliffs of the Bay of Jûneh, and when the waves sweep in at sunset time there is a scene of wild beauty. Almost at the edge of the cliff one can often see a patient plowman with his slow-footed beasts outlined against the glowing sky.

of barbaric jewels—yellow, pale green, and violet—heaping the horizon. And now it searched out six Greek columns, brooding over the desert, smiting them into reddish gold. We were at Baalbek.

BAALBEK A FOUNTAIN IN THE DESERT

Instantly, from the long day's glare and swelter, we were plunged in among cool greenness, the smell of fruit orchards, the enveloping chimes of running water. Oasis amazement thrilled us. One must invent the word. It is an emotion as clean-cut as a date palm flattened against a desert sky.

Greek, Roman, and Arab have come and gone, rebuilding this oasis-surrounded fane of Baal, the light god, with shrines to Jupiter, Venus, and Bacchus, or demolishing these for their metals. Pagan shrine, Christian church, Moslem fortress—shattered shells of these still mingle on the hoary site. But, after a few thousand years or so, it has all returned to Baal.

Careless of priest and ritual, the light god suffuses Greek or Roman column rose-pink at dawn and golden brown toward dusk. And, magnetlike, they draw one back at all hours—those lone columns—until, by sunshine and star-glow, one has unconsciously become a worshiper.

Baalbek village, nestling in the green grove which enfolds it and the ruins, its few hundred houses often patched out with column stumps and temple stones, is an appropriately simple environment for the site of so ancient a cult. Its embowered ways thrill with the endless symphony of a stream which twists everywhere—past clacking millstones, stooping water-drawers, lush orchards, and homecomers from the sunset-reddened plain.

Out from under Mount Lebanon's snow peak and across the plain they trail, family by family, to gain the rushing stream at the foot of those gold-flushed columns that bare themselves to the sunset.

Around the camel, laden with sacks of field gleanings, swarm the sheep, followed by a crook-bearing shepherd, his white-veiled wife on donkey back, his patriarchal father and his little bright-eyed children. "*Saa-id!*" (Greeting!) these murmur shyly, offsetting the sheep dog's growl.

They halt at the rushing stream, drink, bathe their feet, then pass homeward. Family by family they halt thus, drink, bathe, and pass within their high-walled gardens. Now the village is like a shut sheepfold. The day is done. Nothing but the timeless ruins remain, a dream under a dying sunset.

Early travelers who wrote of the nearby mammoth "Stone of the Pregnant Woman," as the Arabs name it—a 1,500-ton block, finished on five surfaces, and on the sixth still uncut from the quarry-bed (see page 679)—record that the natives believed that its duplicates in the temple wall had been lifted there by the jinn of that mighty magician, Solomon.

MIRACLES ATTRIBUTED TO "DEVIL-BIRDS"

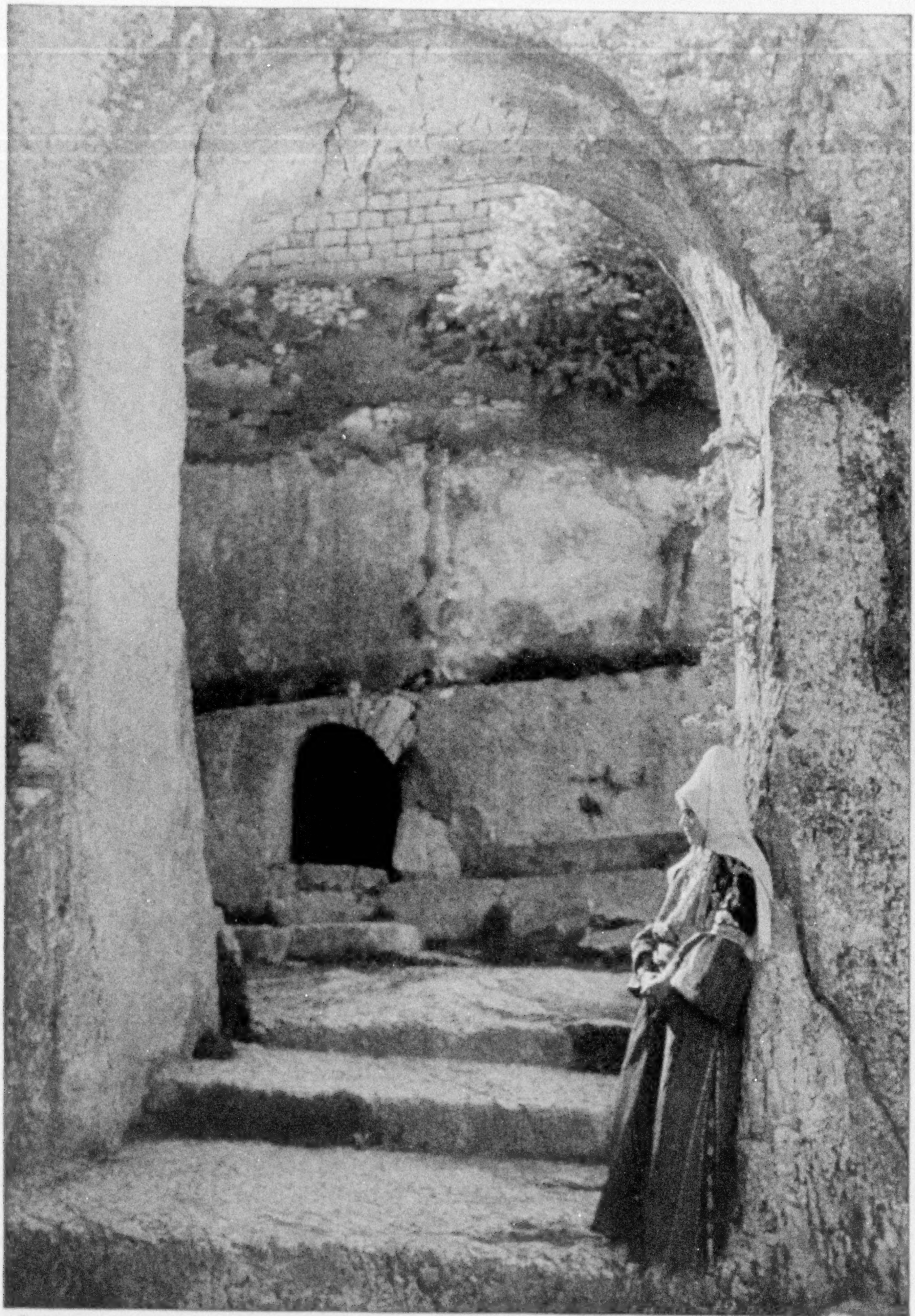
Unhappily, the World War killed this picturesque tradition, for our Arab guide, who had not been in an air raid for nothing, gravely assured us that the ancients had lifted the stupendous blocks into place with the assistance of "devil-birds" (airplanes).

At least one native of Baalbek dreads the very word "ruins." We were secretly counseled by the oldest living inhabitant to visit this man's cellar while he was absent in the fields. We did so and discovered a perfect section of a small Roman theater, upon which the house was built. Our amateur archeologist went wild with delight. He said he could prove by its dimensions that the Romans were the fathers of the little-theater movement, and that all the world must be told of it. Just then the owner happened to turn up.

"Man," exclaimed our friend, "you've got a gem, a jewel! Don't you know that your cellar is a Roman theater?" The wretched owner all but sank on his knees in terror.

"Tell no one!" he pleaded. "I unearthed it years ago, while building. It is my nightmare. If the government knew, it would be dug up for travelers to look at, and then—Istaghfir Allah!—I and my children would be left homeless."

We headed for the sea, a six-hour motor trip, our road winding upward through the cedar-clad Lebanons, sadly



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ENTRANCE TO AN ANCIENT SEPULCHER IN JERUSALEM

This, the finest of the Holy City's rock tombs, is still called the "Tombs of the Kings" although the rulers of Judah were not interred here. It is the burial place of Queen Helena of Adiabene, a convert to Judaism who helped the poor during a famine in Jerusalem. In the doorway, wearing a white veil over a high tarboosh, is a married woman of Bethlehem.

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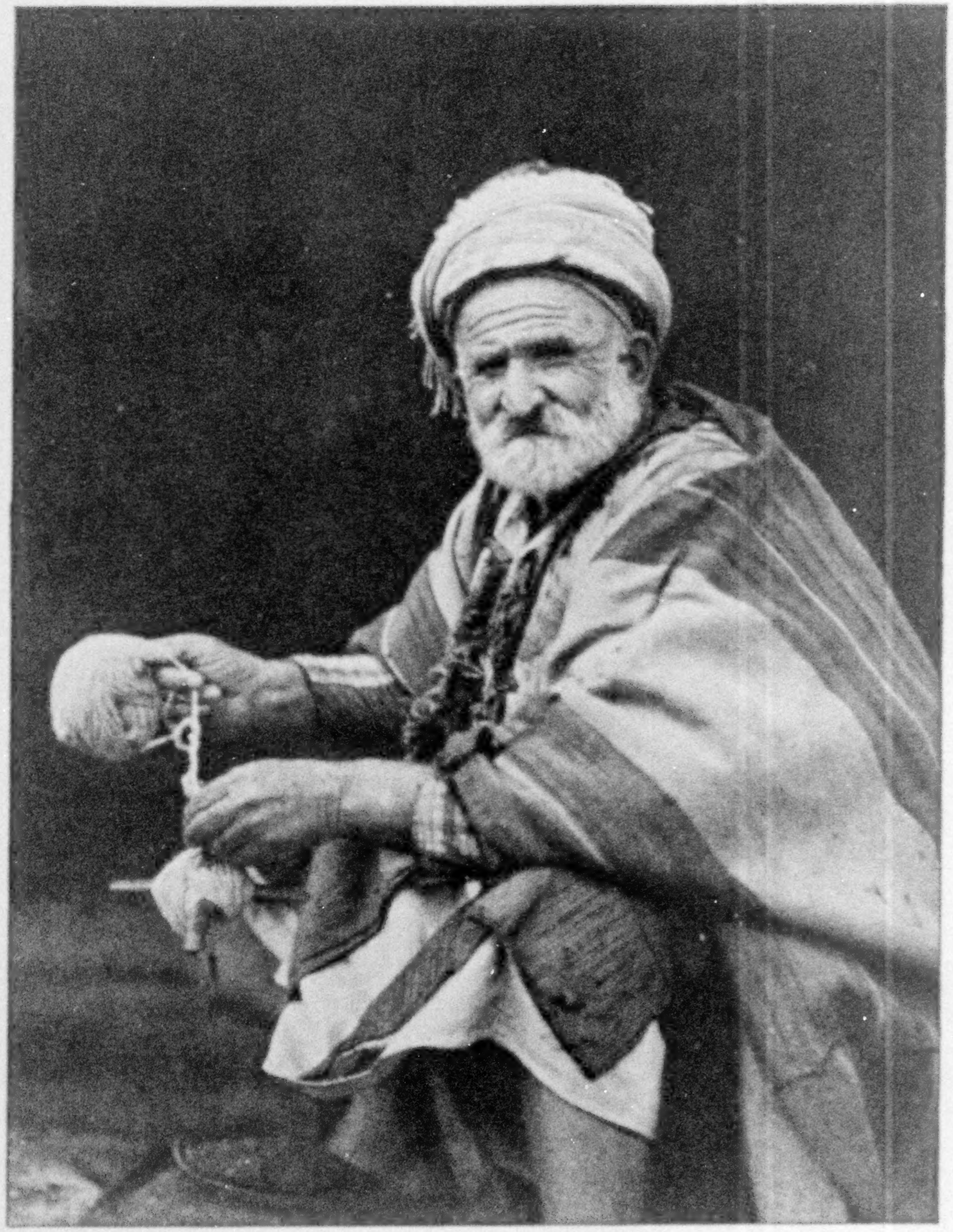
THE HOLY CITY FROM THE MOUNT OF OLIVES

One can look across the walled city, from the Golden Gate, obscured by shrubbery, to the Jaffa Gate, to the right of the square "Tower of David." In the middle distance is the Temple Area, once the threshing floor of the Jebusite, now graced by the octagonal Dome of the Rock, under whose colorful canopy the native rock of the threshing floor on Mount Moriah can still be seen (see also Color Plate XXII).



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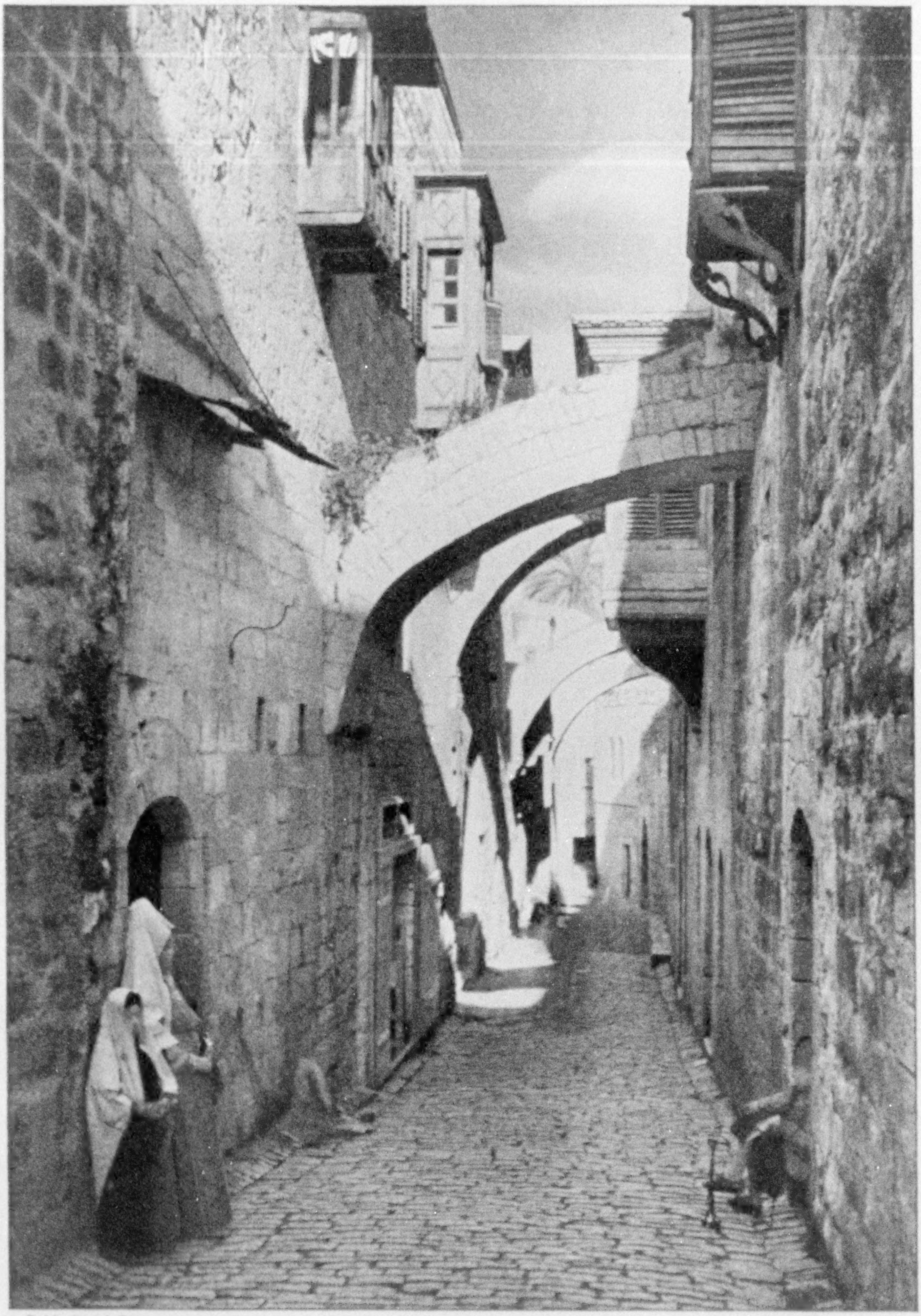
A CHRISTIAN SCHOOLGIRL OF RAMALLAH

A scarf such as that worn by this young woman may have served Ruth when she gleaned an ephah of barley in the fields of Boaz. It is heavy with silk embroidery and fringe. The dark gown is that worn on workdays or by those in mourning. Among the four main types of costumes seen in Palestine, those of Ramallah are most attractive.

A TURBANED PATRIARCH

Palestine is a land of comely young women and handsome old men. The years which affect the fleeting beauty of the former bring dignity and character to the faces of the latter, who are at their best when in repose, gossiping among themselves, soaking up the sun, or lazily spinning a handful of snowy yarn.



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THE "WAY OF THE CROSS," FROM PILATE'S HOUSE TO GOLGOTHA

No similar thoroughfare is as well known as the Via Dolorosa, marked by the fourteen stations of the Cross. Yet in Jerusalem to-day, few know where it begins and where it ends, since it includes parts of several streets, each with its own profane name. The view here shown is near the place where Simon of Cyrene took up the Cross of Christ to bear it up the then steep ascent from the Tyropoeon Valley to Calvary.

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THE CHILDREN OF ISRAEL STILL WEEP "FOR THE PALACE THAT LIES DESOLATE"

The Wailing Place of the Jews is along what is thought to be a section of Solomon's temple walls in Jerusalem.

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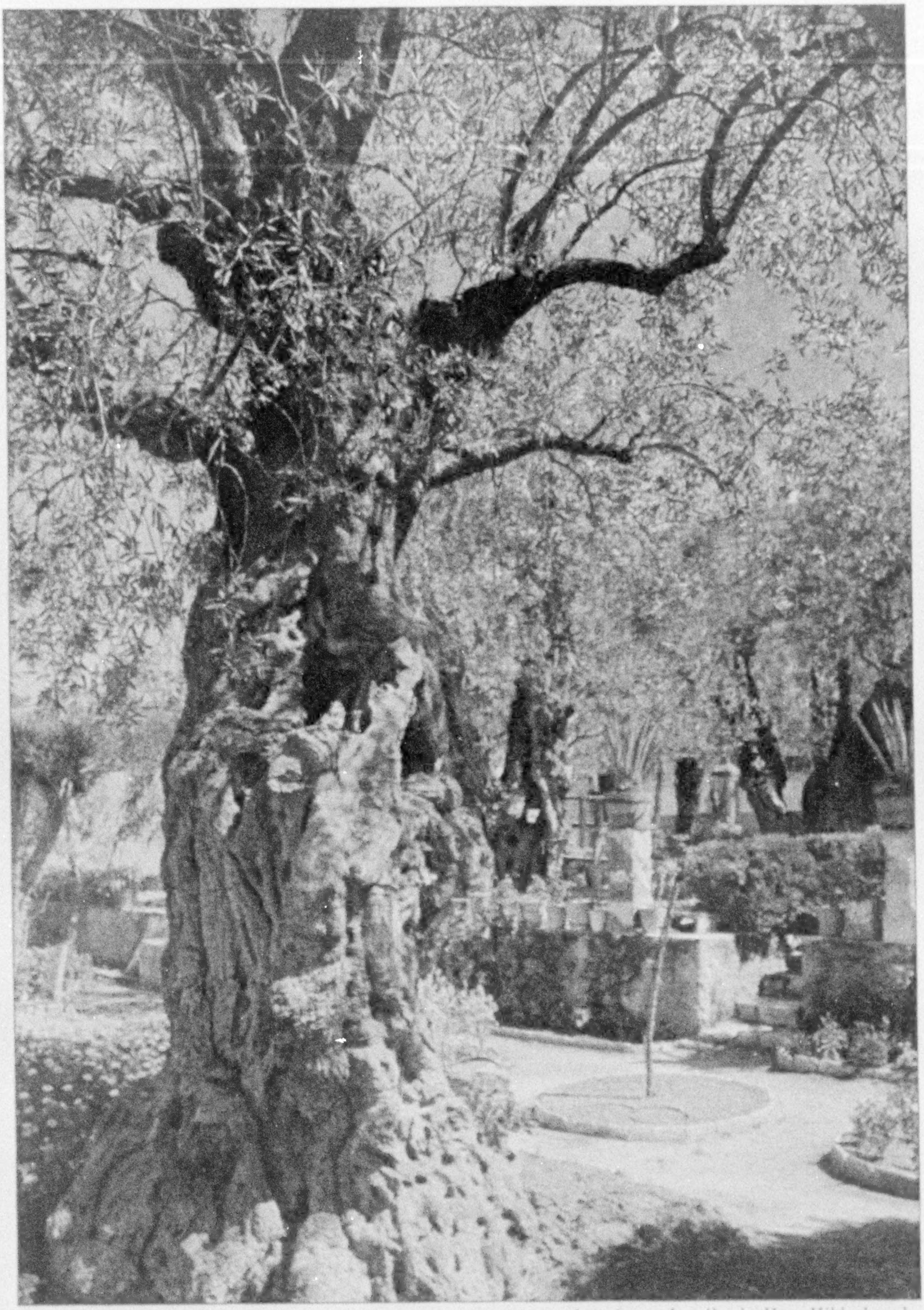
MOSLEM WOMEN WEEDING A GRAIN FIELD OF SAMARIA

Dominating the south end of the plain of El Makhna is Huwâra, whose women are remarked for their fanaticism and their beauty. The most beautiful women arouse the greatest jealousy and hence are kept in the closest seclusion. These agriculturists are pulling the tares from the young wheat, for it is not until the grain is high that wheat and tares are allowed to grow together until the harvest.



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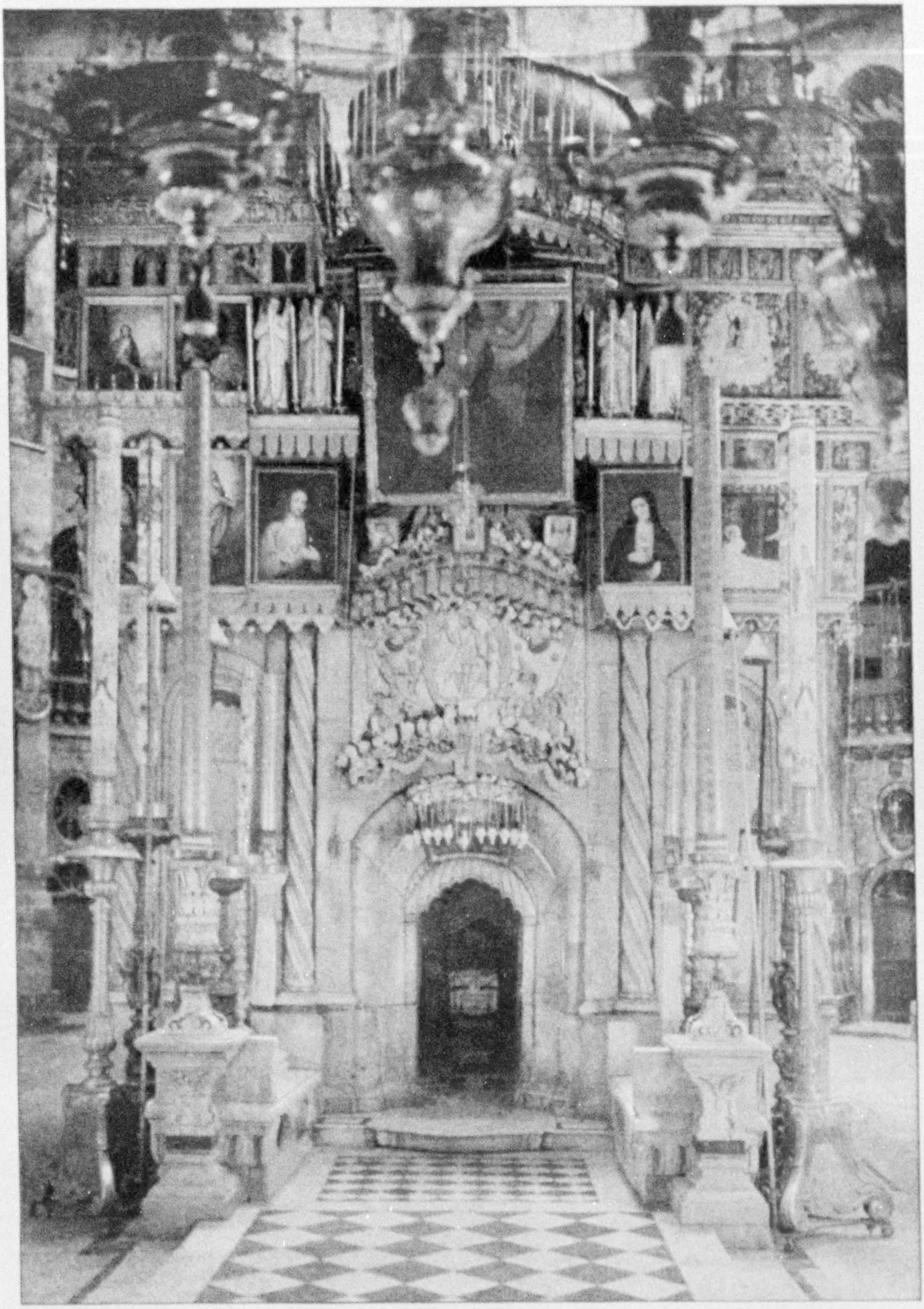
THE GARDEN OF GETHSEMANE

From the days of Jesus, the slope facing Jerusalem across the Kidron Valley was called the Mount of Olives, and Gethsemane got its name from an oil-press. Bent, wrinkled olive trees in the Franciscan portion of the Garden are said to be those under which Jesus prayed. Their leaves are prized by pilgrims, their oil brings fabulous prices, and their seeds are made into rosaries.



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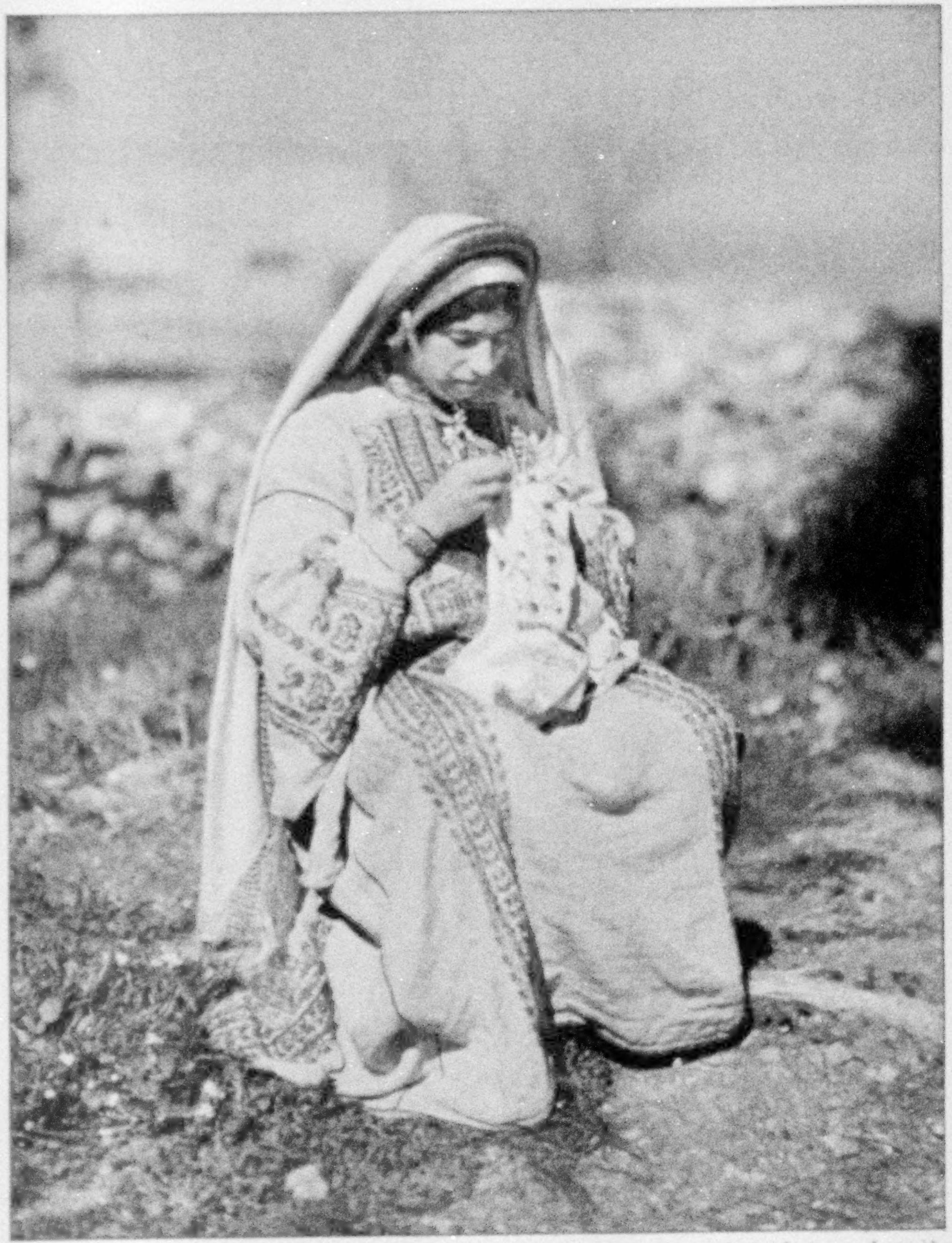
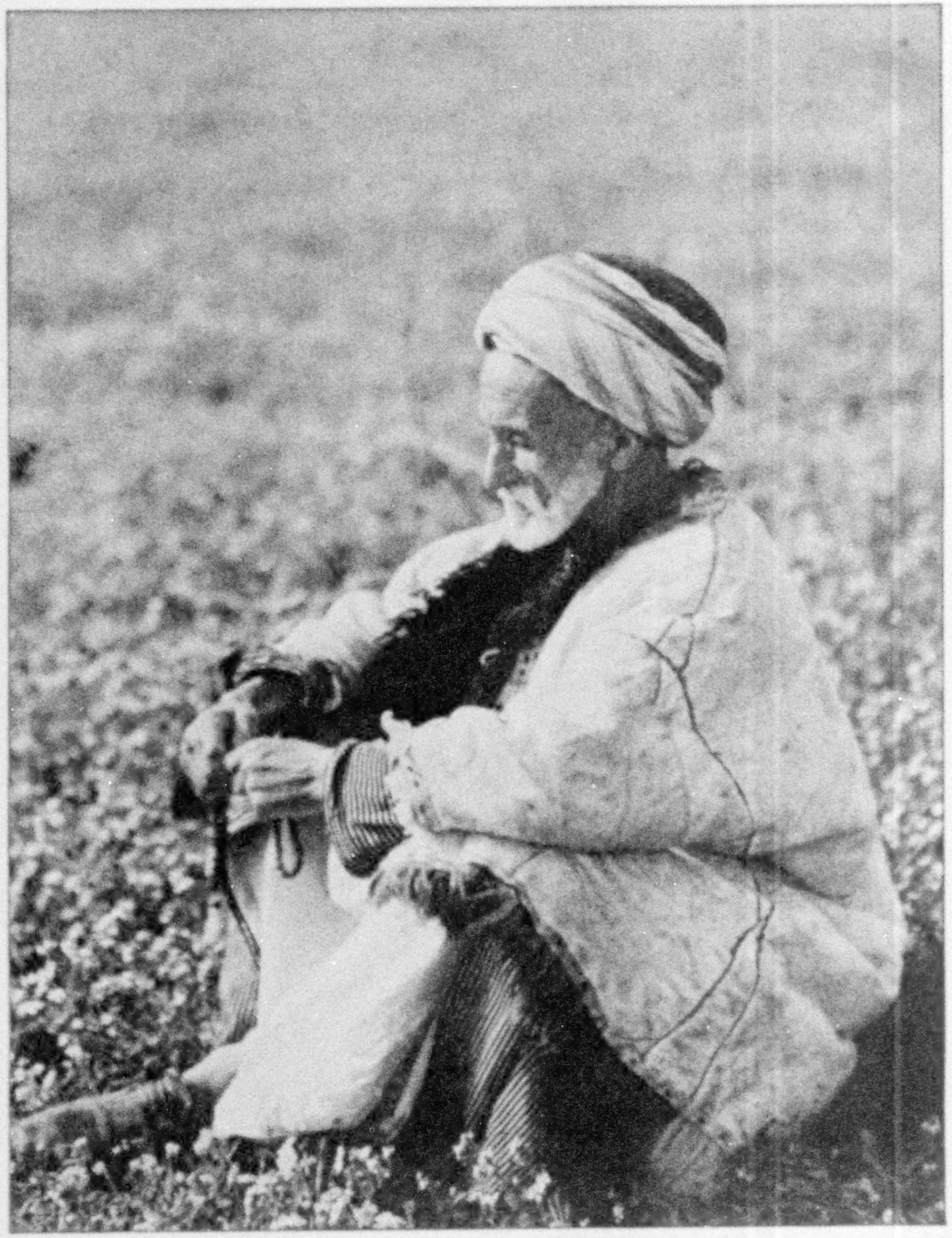
CHRISTIANITY'S CHIEF SHRINE—THE HOLY SEPULCHER

Latins, Greeks and Armenians vie with one another in revering this overdecorated chapel as the rock tomb of the Savior. Inside are two tiny rooms, the first being the Chapel of the Angels, where the Resurrection was announced to the two Marys, the inner chamber being the sepulcher itself. No other spot in Christendom is the center of such veneration.





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A NEEDLEWORKER OF RAMALLAH

Although silken head-shawls, imported from Italy, are taking the place of sturdy scarves, hand-embroidered with deep red silk, the women of the Christian village of Ramallah still take great pride in their needlework (see also Color Plate III).

A MOHAMMEDAN SHEIK OF EL-BIREH

Intent on his string of beads, the adult Moslem's chief toy, this patriarch rests amid the wild flowers which intrude into his vineyard. Behind the field where he sits in silent meditation, two football teams are being coached by an American athletic instructor.

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THE BOY JESUS GREW TO MANHOOD HERE

A hill town, perched high above the wide Plain of Esdraelon, Nazareth has its own more intimate valley at its very feet. Its higher buildings, especially the large Salesian Orphanage, can be seen from far out on the Field of Armageddon, where Jewish colonies are springing up as if by magic. But the main part of Nazareth is cupped in the Galilean hills. It is just off the main road connecting one of the chief ports of Palestine with the Holy City, one hour from Haifa and four from Jerusalem by automobile.

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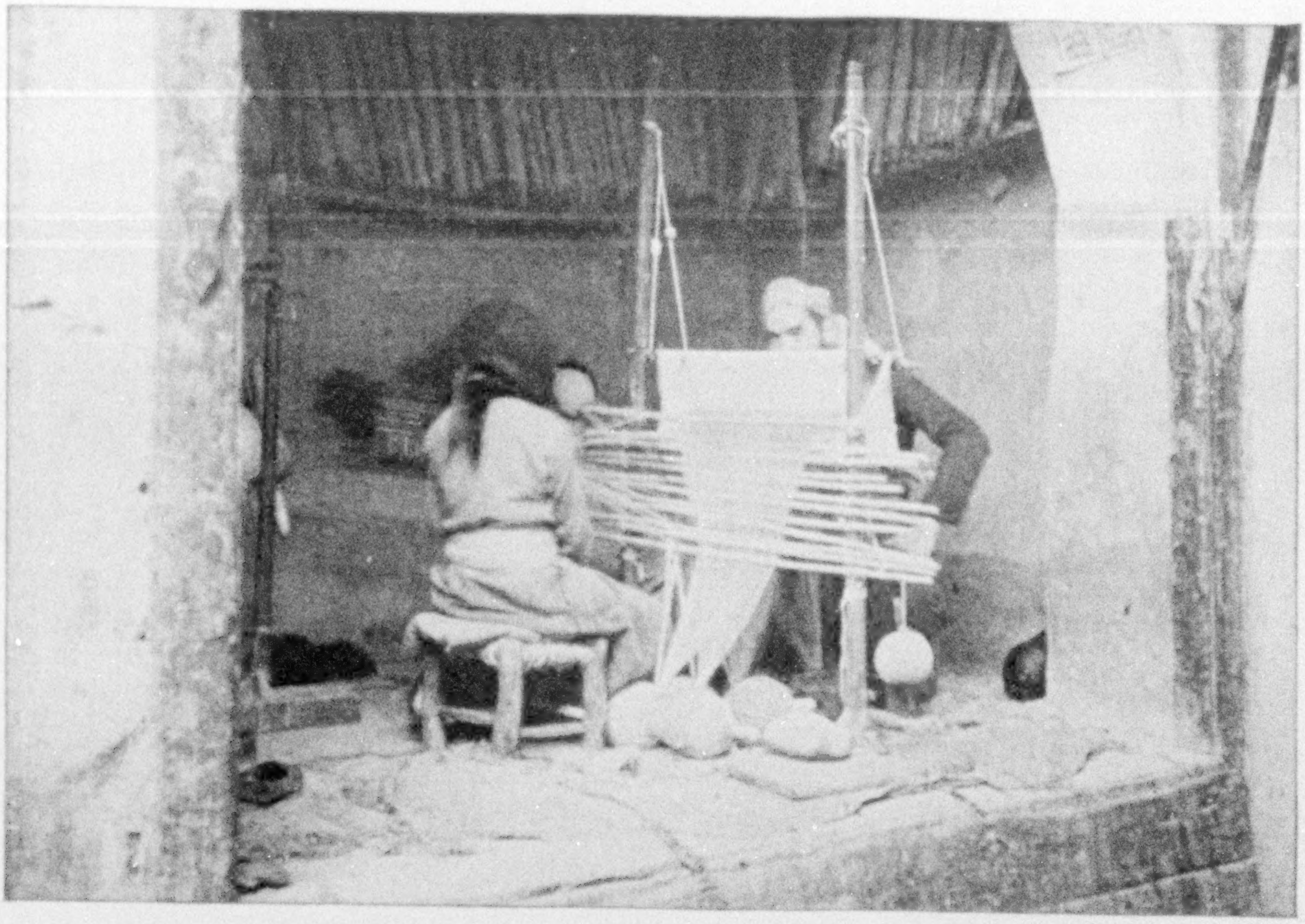
WHERE JESUS, CLAD IN PURPLE AND CROWNED WITH THORNS, FACED HIS ACCUSERS

Above the Via Dolorosa (see Color Plate IV), near the traditional site of the Praetorium, curves the Ecce Homo arch, where Pilate said "Behold the man." This is the middle section of a triple arch, one of whose side arches, standing on a bit of Roman pavement, is now in the Church of the Sisters of Zion, on the right. One of the Bethlehem women here seen wears the high veiled tarboosh of the married woman (see also Color Plate I).



A WEAVER IN THE WORLD'S OLDEST CITY

Since the invention of the handloom, Damascus has been the home of weavers in cotton and wool and silk. Under what seem to be primitive conditions, fabrics of rare beauty are produced and in spite of machine-made imports, the hand-woven stuffs of Damascus command a wide market and keep thousands of shuttles a-clatter beside the narrow streets.

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A COURT IN ONE OF THE PALATIAL ARAB HOMES OF DAMASCUS

The Oriental veils his wealth and gardens from the public gaze as he does his harem. Prosperity and worldly welfare are not common things to be displayed to every stranger. They are a part of that hospitality which gains in force because it is exclusive. One enters upon its favored quiet and perfume from narrow streets, whose raucous noise and offensive odors are shut out by blind mud walls.

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CHRISTIAN CLASSMATES OF RAMALLAH WEARING PALESTINE'S CHOICEST COSTUMES

Shy, alert, vivacious, the girl at the left, wearing a festal costume every stitch of which she made herself, differs widely from her placid, well-poised handsome companion at the right. The straw-colored scarf and gown, richly embroidered, is Palestine's most attractive costume. The dark gown, usually worn with a dark head-shawl, is more commonly seen, especially since it is worn by those in mourning, for funerary observances include distant relatives and last a long time (see also Color Plates III, VIII, and XIX).

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THE SOFTLY ROLLING SLOPES OF GALILEE

It was in such flower-carpeted fields, gently dropping away to curving valleys and commanding distant views of the Sea of Galilee, that Jesus preached the Sermon on the Mount and attracted his Disciples. The Galilee landscape, setting for so many homely but deathless parables, makes a poetic appeal to the knowing eye and the understanding heart.

A FIELD OF THE DEAD IN DAMASCUS

Simple as the interior of a mosque, a Mohammedan cemetery does not point with glowing epitaph or towering monument to a more or less illustrious past, but is a naive reminder of the death that levels all.

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A CENTER OF TOWN LIFE IN SYRIA

Neither radio nor movie, athletics nor motorcar, has robbed the Arab café of its charm. It is the club where variety of companionship emancipates from conventional boredom. The coffee-house is the recognized rendezvous for all classes of mankind, and in its rude chairs or beside its wobbly tables fellowship thrives on talk.

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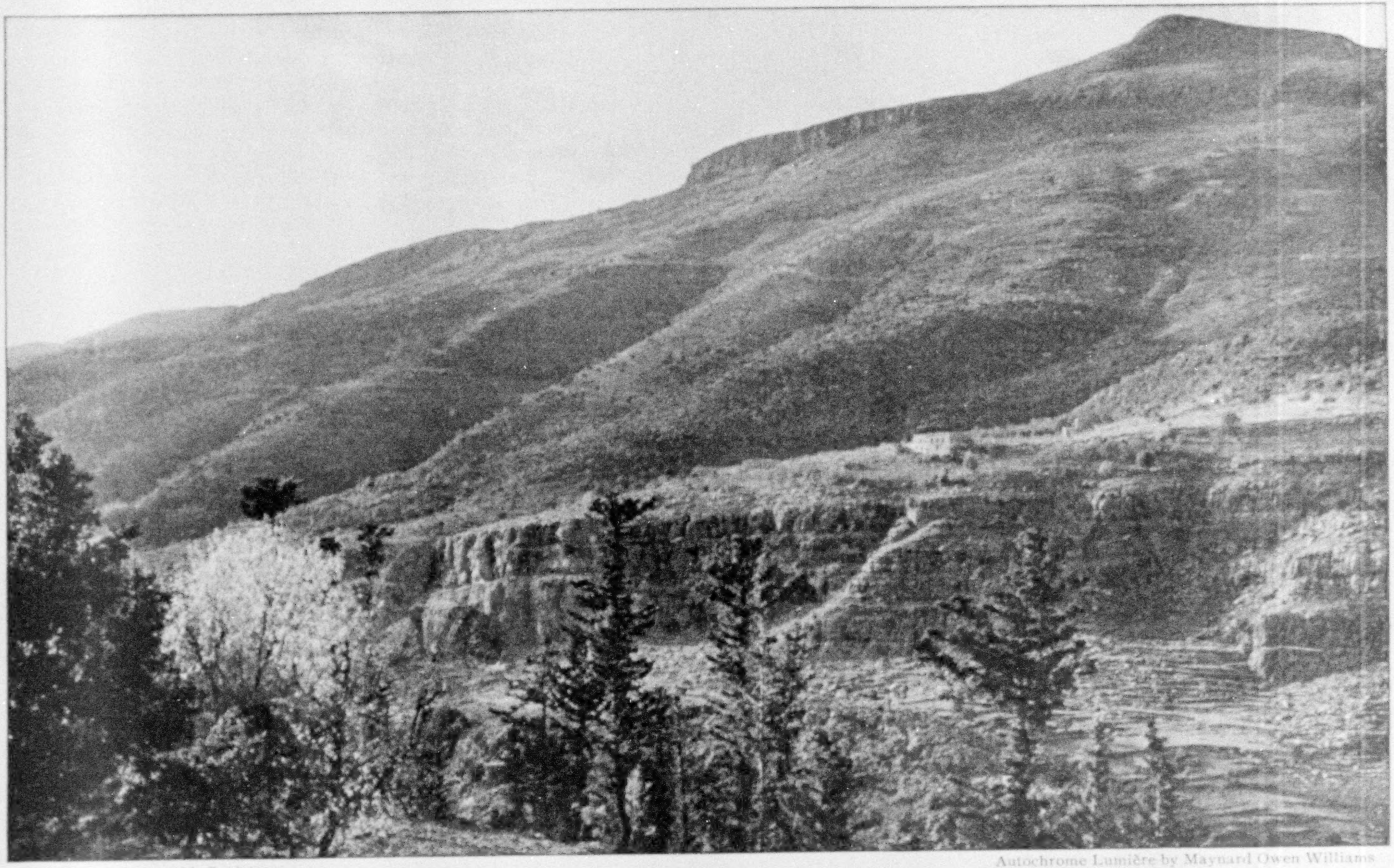
MARY AND JOSEPH MISSED THE BOY JESUS NEAR THIS SPOT

Ten miles north of Jerusalem, on a high transverse ridge from which the suburbs of the Holy City can be seen, are two villages: the Mohammedan El-Bireh and the Christian Ramallah. In olden days, because of the abundance of water at this spot on the highroad, this was a favorite stopping place for caravans bound for Samaria, Galilee and Damascus. Fourteenth-century pilgrims decided that this was the spot where the 12-year-old Jesus was missed by Mary and Joseph. It is now only 20 minutes by automobile from the walls of the Holy City. Luke calls it a day's journey, but the best part of the first day is often taken up with preparations.



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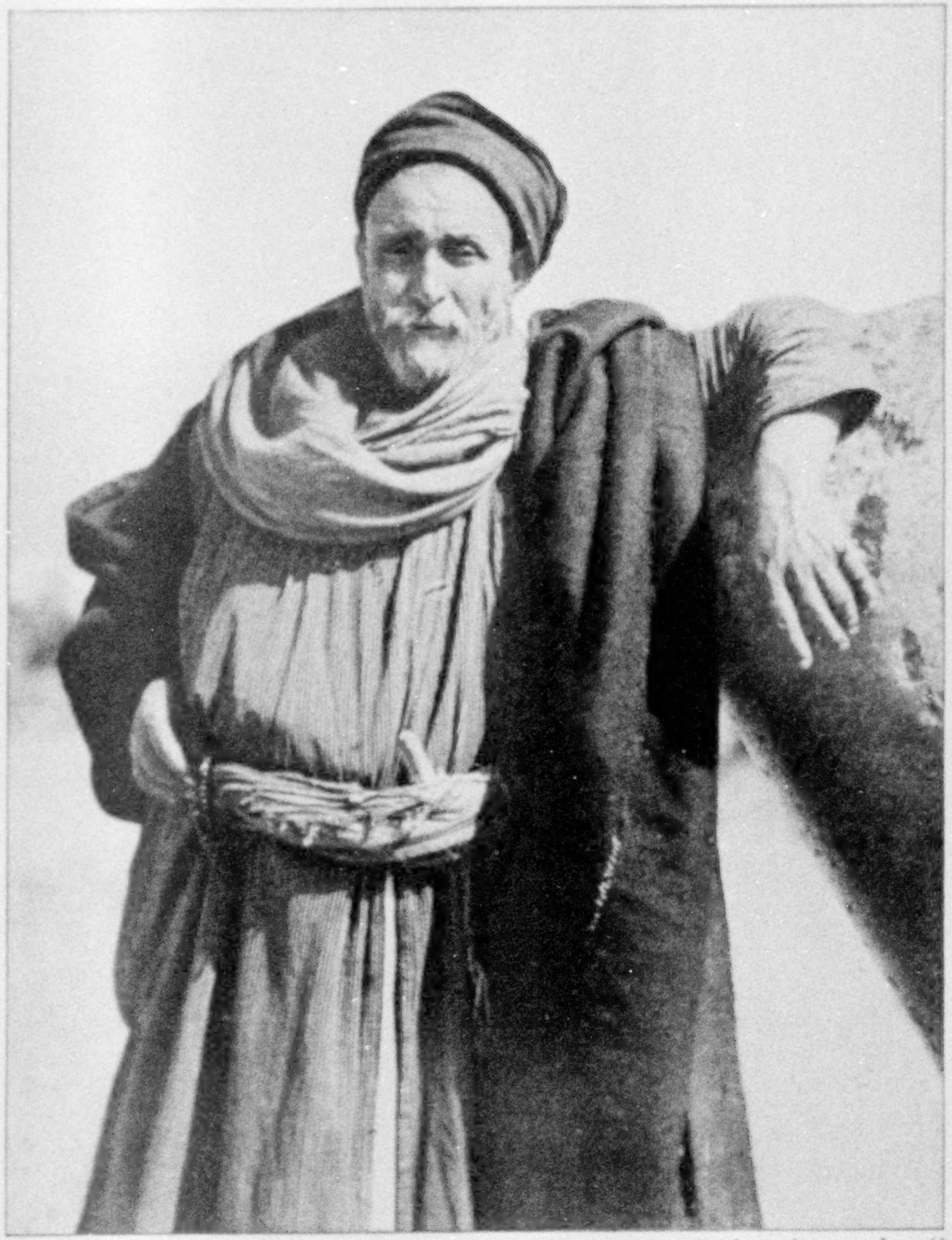
IN THE HEART OF THE LEBANON

Cut by deep gorges, terraced with mulberry and vine, stretching northward from the low hills of Galilee to the mighty mountains whose arms enfold the world-famous cedars, the Lebanon Range is the home of thousands of humble folk of one race and many religions. It is a nursery for American citizens, a retreat for returning emigrants, a Christian enclave in the Moslem world, and the back-drop for tiny, offshore islands from which the Phœnicians set out on voyages of trade and discovery.



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A NOMAD CHIEF ON THE SITE OF OLD TIBERIAS

South of the rapidly growing city of Tiberias, where modern villas are climbing the hills beside the Sea of Galilee, is the site of the ancient city, now in almost indistinguishable ruins. Ancient columns, once shaped with infinite toil and brought from afar by primitive means, now protrude unnoticed above a field of potsherds. And above houses once called permanent, the black tents of the nomads are pitched.

Autochromes Lumière by Maynard Owen Williams

A DESERT WOMAN ENCAMPED IN THE TOWN OF WOES

Chorazin, in Christ's day, was a city. Recent excavations have laid bare the walls of its basalt temple or synagogue, where men and women are shown treading the wine-press. The woes Christ uttered fit the present case. Tyre and Sidon, humbled though they are, still exist. But at Chorazin, once so proud, only the black tents of the Bedouins rise above the rocky fields where scarlet poppies nod.

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LEBANON'S LOVELIEST SUMMER RESORT

Mount Sannin, 9,022 feet high, is the background for St. George's Bay at Beirût. But a finer view of it is obtained from Shuweir, which sits with its back to the sea and the afternoon heat and gazes up the Wadi Sannin to the wide flank of this splendid bit of the Lebanon Range. Too far from Beirût to attract commuters, Shuweir is gaining in popularity as a summer resort for the foreign community and for visitors from Egypt. The soil is a pleasing tint of eye-resting red and there are groves of umbrella pines in whose shade are charming walks to pleasant picnic grounds (see also Color Plate XVI).

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MOSLEM AND CHRISTIAN NEIGHBORS OF EL-BIREH AND RAMALLAH

Among the peasants and small-town dwellers of Palestine, the veil is seldom used for concealment. But convention makes it difficult to obtain photographs of women. This convention, which has a religious significance to the Moslems, is often equally strong among Christians. The woman at the left is a Moslem matron of El-Bireh, the other a schoolgirl of the Christian town of Ramallah. The chaplets of coins worn by both women are thought by some to have inspired the halo in sacred art (see also Color Plates III, VIII, and XII).

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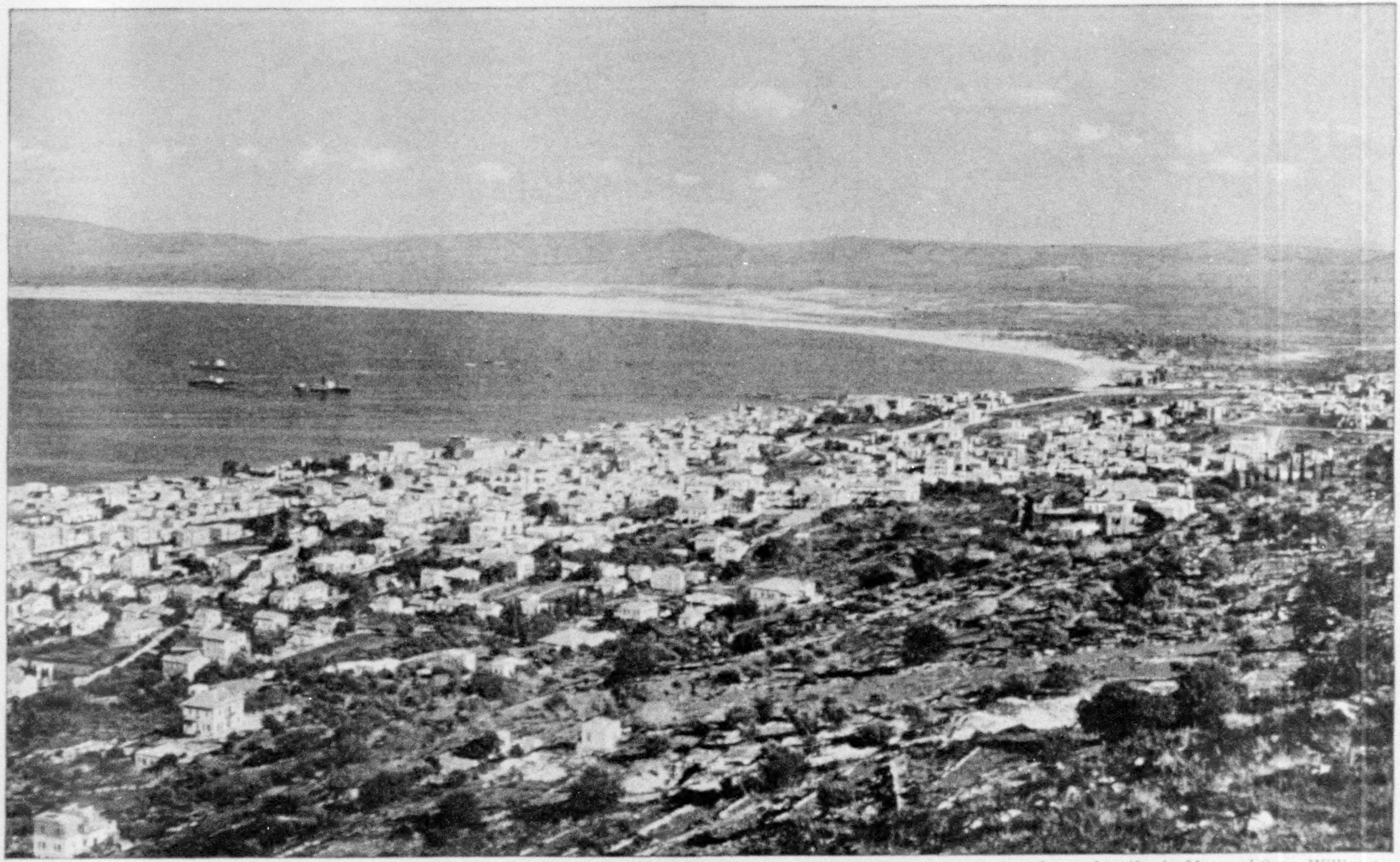
WHERE GREEKS AND ROMANS BATHED, BYZANTINES SUFFERED DEFEAT, AND BEDOUINS FORGET THEIR FEUDS

The classic baths of El-Hammi, beside the Yarmuk, range in temperature from 77 to 122 degrees and still draw crowds of bathers every spring. For the Bedouins, this is neutral ground. High in the hills lies Gadara, and it was here that the Battle of the Yarmuk brought the final defeat of the Byzantines in Palestine. To-day the ancient ruins are almost lost in this empty plain, dotted with Bedouin tents and steaming pools.



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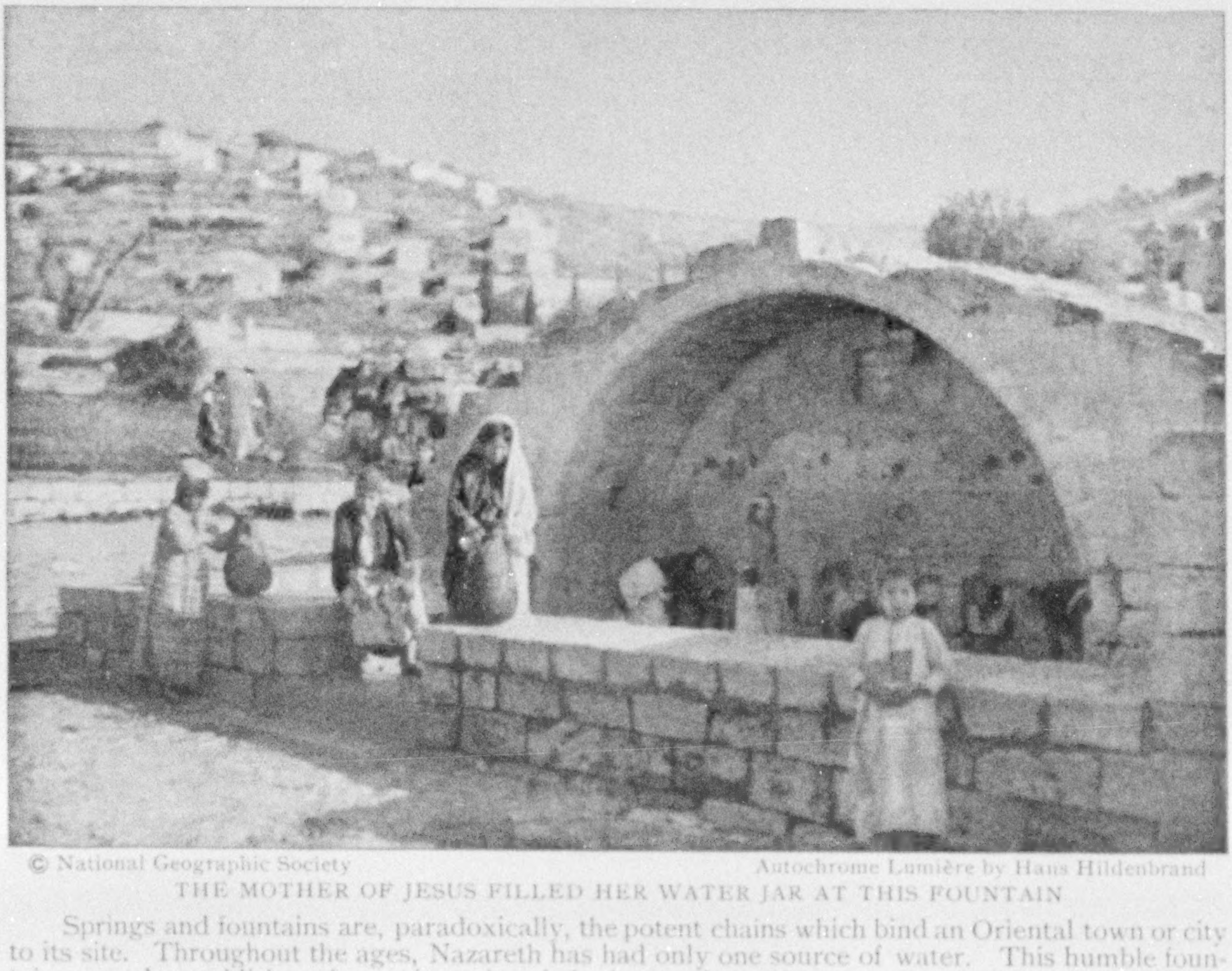
PALESTINE'S TOURIST PORT AS SEEN FROM MOUNT CARMEL

The curving bay between Haifa and Acre, historic harbor for a vast hinterland, is poorly protected and often rough. But the former has displaced Jaffa as a passenger port to the Holy Land. Haifa is rapidly growing up the side of Carmel and contains most of the few factories that Palestine possesses. The automobile highway connecting the seaport with Tyre and the Phœnician coast runs on the white sands that cut like a shining sickle blade around the blue bay. In the background are the hills of Galilee, beyond which, on clear days, Mount Hermon lifts its snowy head (see also Color Plate XIII).

ONCE THE PRAYER-POLE OF THE MOSLEM WORLD

To-day, the Dome of the Rock is second to the Kaaba in the eyes of the Mohammedans. But before Mecca was healed of its heathen practices, Mohammed commanded his faithful ones to turn toward this site of many temples when they prayed. Here David had his simple altar. Here Solomon erected the temple described in I Kings. Here Herod planned too grandly to permit complete accomplishment. Here Hadrian erected a temple to Jupiter.



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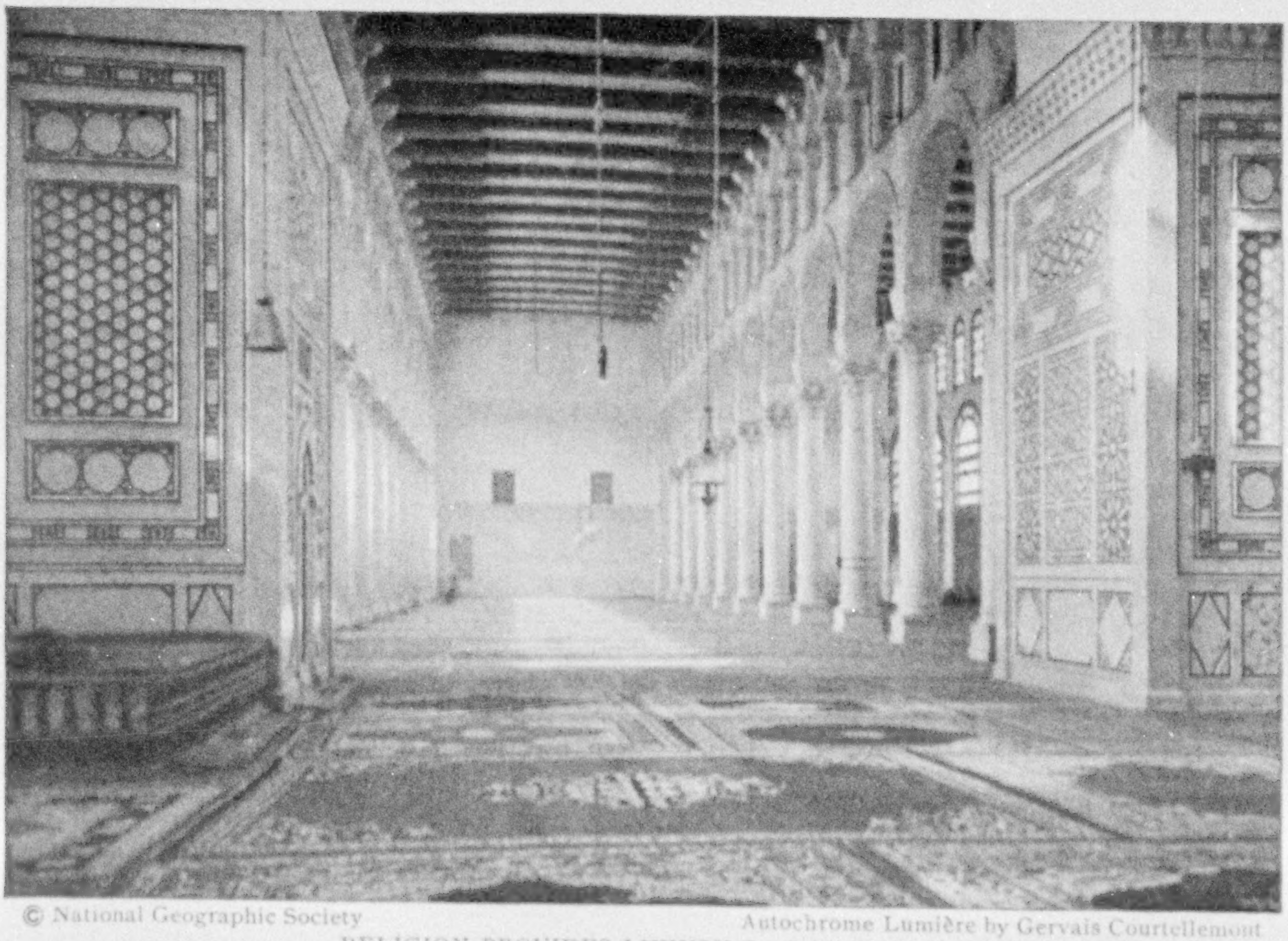
THE MOTHER OF JESUS FILLED HER WATER JAR AT THIS FOUNTAIN

Springs and fountains are, paradoxically, the potent chains which bind an Oriental town or city to its site. Throughout the ages, Nazareth has had only one source of water. This humble fountain not only establishes the ancient site of the home of the Nazarene, but is unquestionably the source from which Mary drew the water for her family and at which the adolescent Jesus slaked his thirst.

IN THE COURT OF THE OMAIYADE MOSQUE IN DAMASCUS

Near this spot is the tomb of Saladin and of John the Baptist's head. From here the Holy Carpet for the Kaaba starts for Mecca. Changed by fire and religion, the Omaiyade Mosque has never recovered its former beauty. But it is the finest public structure in a city whose interest lies more in the people who crowd its colorful bazaars than in the glory of its architecture (see also Color Plate XI).



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RELIGION PROVIDES LUXURY FOR THE POOR

Wherever found, a mosque has an air of quiet, of cleanliness, of refuge from the distractions of bustling bazaar and packed serai. Often it adds to this spotless coolness the luxury of rich rugs or soft matting, elaborately decorated marbles or graceful colonnades representing the robbery and ruin of many another house of worship or wealth. Upon these soft rugs, prince and pauper sit barefoot, side by side.

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A MOSLEM GIRL IN THE CITY WHERE THE JEWS AWAIT THE MESSIAH

Race, religion and language have woven strange patterns into the life of Safed. Algerians, who followed Abd el Kader into exile; Spanish rabbis, driven from their homes in Iberia; Polish Jews, protected by Austria; Circassians, fleeing the Christianization of the Caucasus—all have sought refuge in this northernmost city of Palestine. Here in 1563 the Ashkenazi brothers set up the first printing press in the Holy Land. Here the Sephardim Jews still live in polygamy. The site of the castle which Saladin had difficulty in reducing and where Napoleon's troops found shelter is now a forest preserve.

thinned out since the days when Hiram, King of Tyre, floated logs down the coast for temple building at Jerusalem (see page 689). As we gained the mountains' crest a vast panorama of red soil bordered by the blue Mediterranean disclosed itself; then we coasted down the sinuous road to sea-bordering Beirût.

Here a century of foreign penetration, wherein European and American missions have contributed richly in the educational field, has disoriented the native life more strikingly than anywhere else in the Near East.

Rhodes had its eight tongues and Beirût has its eight Christian bodies, comprising more than 120,000 people, or a large majority of the population. Electric-car service, European hotels, shops, and newspapers—these and a bustling commerce are fast superseding bazaar life and the nargile-smoking devotee of kief. The very antiquities, instead of being scattered orientalwise over the landscape, are neatly carded in college museums.

A motor trip from Beirût along the Syrian coast northward to Tripoli and southward to Haifa comprises what might well be described by some hustling tourist agency as "Seeing ancient Phœnicia in six hours." Indeed, it is striking to discover that the foremost commercial nation of antiquity, with lines of communication stretching as far west as England, occupied a mere ribbon of seaboard territory two hundred miles long and from ten to twenty miles wide.

A DISTRICT FAMOUS FOR SILK SINCE THE DAYS OF HOMER

Both Tripoli and Latakia still carry on Phœnicia's trading tradition, each exporting annually several millions of dollars' worth of merchandise, the former in silk, fruit, and olive oil; the latter in silk, sponges, and her famed tobacco.

Tripoli edges on a veritable forest of fruit orchards, while all along the Lebanon's sea-skirting foothills terraced mulberry trees speak of a silk industry which doubtless has been going on ever since the days when Homer eulogized the garments woven by Sidonian women.

At Jebeil we found the entire population of an American orphanage disporting itself on the sheltered beach, where, of old, Phœnicia's best ship-calkers careened her war galleys and merchantmen. Ezekiel catalogues fir planks, cedar masts, oak oars, rowing benches of ivory, and embroidered sails as the make up of these ships, whose arrangements for the threefold purpose of exploration, freight-carrying and warfare so excited the admiration of the early Greeks.

Back of the crow's-nest town of Ghazir, high over the beautiful Bay of Jûneh, corkscrew turns led us through a mountainous neighborhood which of old had probably comprised one of those "high places" of pagan worship so condemned by Israel's leaders. At least we found villagers who had inherited the tradition that certain odd-shaped bowlders had been holy since time immemorial.

Not far off, in a wild ravine, the Spring of Adonis, with its reddish waters suggestive of the god's spilled blood, bore witness to the Phœnician cult of Baaltis and Eliun, her boar-slain lover, the Venus-and-Adonis myth of later Greek legend (see illustration, page 694).

WHERE A KING RAN A LUMBER-JACK CAMP

Though four of the Phœnician ports have still a considerable trans-Mediterranean trade, not so much can be said for coastwise commerce. Not a smoke cloud or sail flecked the sea horizon along our route. So we fell back upon Phœnicia's past performances, to wit, the logging operations of Hiram, King of Tyre, and incidentally building contractor for King Solomon.

This long-term contract called for cedar and fir logs to be conveyed "down from Lebanon unto the sea," thence to be shipped "in floats" and discharged at Joppa (Jaffa), Solomon undertaking the land haul to Jerusalem and guaranteeing payments on the installment plan, whereby Hiram was to receive annually 20,000 measures of wheat and 20 measures of pure oil.

With an army of 150,000 lumberjacks, quarriers, and burden-bearers at work, the Lebanon's slopes must have presented a busy sight, and what we viewed as an empty seacoast must have been alive with long lines of log floats moving under tow.

As we neared Sidon, men and women,

Photograph by Maynard Owen Williams

THE SYRIAN COAST IS DISTINGUISHED FROM THE PALESTINIAN BY ITS BOLD HEADLANDS

The majesty of this promontory, Râs Shakkâ, near Beirût, so impressed the men of old that they called it Theouprosopon—The Face of God.

seen in outstretched ranks, were reaping the fields, while behind them moved the gleaners, who now and then threw their accumulations atop a flat bowlder, where children threshed out the grain by beating it with stones.

A little promontory town, dazzlingly white as we neared its old walls, and, seen from within these, a black labyrinth of tunnels with house-bearing arches overhead—where Moslem veil and Christian countenance mingle in the little bazaar, and where the public characters are native priests and foreign missionaries—such is the humble successor of "Sidon the Great."

It is outside the town and underground, where rock-hewn tombs show emptied tiers of sarcophagus niches, that the student might once have sought the ghost of ancient Sidon. But these are now mere excavated shells, and if her ghost walks anywhere it is among the cabinets of a certain local collection.

This splendid find, unearthed by an American resident from his own garden, comprises Phœnician portrait sarcophagi whose exquisite features foreshadow the heads of classic Greek sculpture, vases such as the Iliad attributes to "the skillful Sidonians," lusterware unsurpassable by modern processes, and bronze-work which would draw crowds to a Fifth Avenue show window.

Certainly the ancients' characterization of the Sidonians as "cunning artificers" strikes home when one beholds an example of their dental bridgework—a human jaw containing false teeth held in place by gold wire.

THE GLORY OF TYRE IS ALL IN RETROSPECT

An hour beyond Sidon the curving beach brought us to a huddle of stone huts on a sand spit. Half a dozen byways with a few lounging figures—here a roll of cordage, there some drying nets haunted by a skinny cat, that looked as if she lived on the sheer smell of fish, and yonder the bleared shapes of ancient masonry shouldering through the wastes of sand—and that was all.

Photograph by Maynard Owen Williams

A MARRIED WOMAN OF BETHLEHEM

Her headdress proclaims the social status of this young woman, who lives in the hamlet of the Nativity.

Photograph by Melville Chater

PHŒNICIA'S SPIRIT OF NAVIGATION STILL LIVES IN HER DESCENDANTS

"I shall make thee a desolate city . . . a place for the spreading of nets. . . . What city is like Tyrus, like the destroyed in the midst of the sea?"

Truly, with vision spoke the prophet Ezekiel!

Like some very old woman, Tyre has returned to her second childhood and is once more a humble fishing village, from the like of which sprang her greatness and glory of three thousand years ago. It has shrunk to its germ, the ancient site, by which it was known as the "island city," though due to sand drift and to the embankment built by Alexander the Great in order to attack Tyre from the mainland, its very resemblance to an island has long since been obliterated.

Archeological fame awaits anyone who will brave the curses of buried kings and dig up that yet-unscratched sand spit which covers ancient Tyre. When it came to laying curses, the Phœnician monarchs did it handsomely. Witness the injunction, inscribed on a royal sarcophagus found at Tyre:

"I ordain that neither the nobles nor the people shall open this resting place, nor seek for treasure, nor remove the sarcophagus of my resting place. For whoso shall open or remove this sarcophagus, or disturb this resting place, may he not be buried in a tomb, may he find no rest with the departed, and may no son live after him in his place."

THE ORIGIN OF TYRIAN PURPLE

When one says "Phœnicia," one has almost said *phoinos* (purple). It is amazing that so small a country as "Purple Land"—about the size of Delaware—should have been the source of dyestuffs throughout the Mediterranean world. The Phœnicians' far-reaching salesmanship is stamped on ancient history and the classics in the phrase, "Tyrian purple," a free advertisement which has lasted 3,000 years. Certainly, had the Tyrians been given to trade slogans, "The dye which made Phœnicia famous" would have been justly theirs.

The curious beachcomber may still pick up along the Tyrian shore little shellfish which ooze a purplish liquid. And at Sidon, high-set over the beach, he will find a great bank which, as far down as exca-

vators have dug, is composed of tiny murex shells. Apparently it is the refuse heap of a Tyrian purple factory.

We strolled down to the double harbor which flanks Tyre on either hand. Ancient masonry bared its broken fangs amid the low tide. The deserted beach was paved here and there with remains of what may have been the sea-wall base, still imbedded immovably, despite anything short of dynamite.

One of us brought out a map and traced the Phœnicians' sea routes, running from that desolate beach to their colonies among the Greek islands, at Sicily, Malta, Sardinia, Minorca, Carthage, Elba, along the Spanish coast, and to their "farthest west," the Scilly Isles.

Another read aloud Biblical accounts of King Hiram's voyages for Ophir's gold and the almug tree, and of the navy of Tarshish, which once in three years came, bringing that luscious mixed cargo of "gold, and silver, and ivory, and apes, and peacocks." And all of us moralized upon once mighty, maritime Tyre, of whose fleets, freights, and captains not a trace remained.

But the sea instinct dies hard. And, turning around, we beheld the latest of Phœnicia's navigators—a small, barelegged fisher boy, absorbed in his play. The outgoing tide had left a pool among the hollows of the ancient masonry which paved the lonely beach, and thereon he was launching a tiny, knife-whittled, sail-rigged craft. Away she dipped, while he squatted by the lagoon's rim, breathlessly watching. And one knew—one could read it in his eyes—that she was off to bring back gold, and silver, and ivory, and apes, and peacocks from Tarshish unto Tyre.

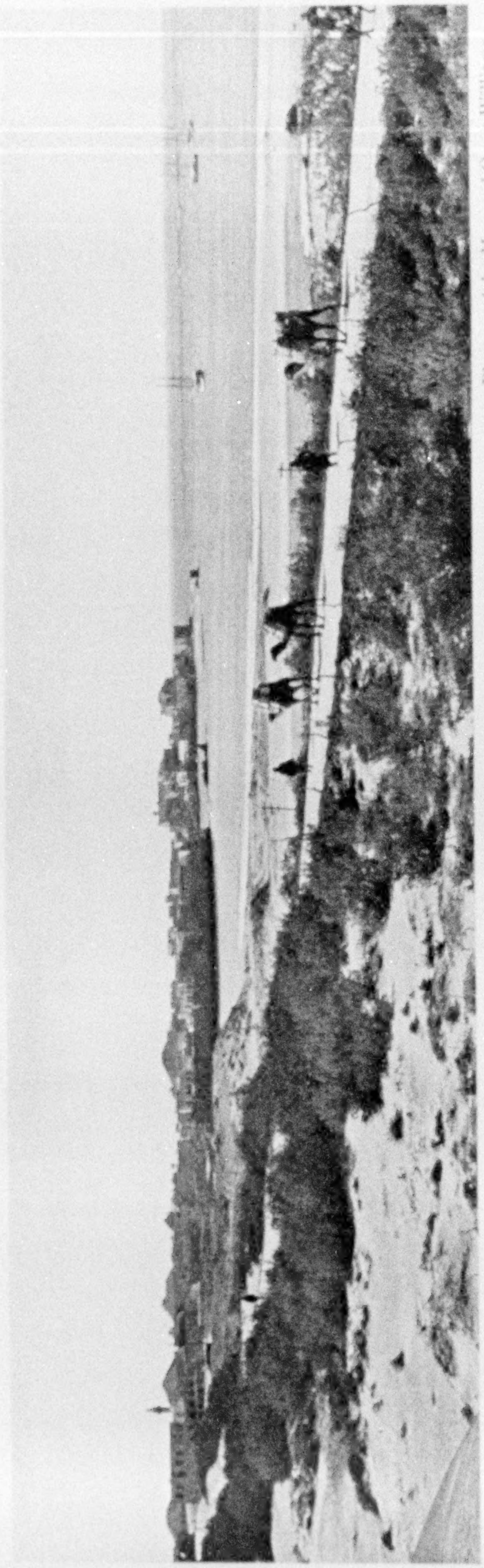
Photograph by Maynard Owen Williams

A LONG DRINK WITH A LIGHT LUNCH: ON THE BEIRÛT-SIDON ROAD

PASSING INTO PALESTINE

An hour's drive southward brought us to the shack of a solitary French officer, doing boundary duty atop an inhospitable rock, twenty miles away from a cigarette. He glanced through our papers, expressed himself as overcome by our contribution of American smokes; then waved us off into Palestine.

The "chicken-wire route," laid across the sand hills for motor transport during



Photograph by Maynard Owen Williams

REMNANTS OF THE ANCIENT SEA WALL OF TYRE, AND THE MODERN TOWN ON A PENINSULA (SEE TEXT, PAGE 724)

the World War did us good service for a while; then we struck a fine ten-mile curve of beach, along which we sped, with the ocean lapping at our wheels.

A stalking, outstrung camel train silhouetted itself between yellow sands and turquoise sea, its decorum vanishing in a pell-mell scatter, as we shot past.

AGRICULTURAL COLONIES ARE CHANGING PALESTINE'S ASPECT

Beyond Haifa we glimpsed a neat tree-surrounded community of cement cabins, marking the commencement of the Jewish agricultural colonies.* Of these, one in the valley of Jezreel is perhaps the most interesting. Here swamp-draining has resuscitated ancient springs for irrigation, and a selected colony of experienced agriculturists has been efficiently housed and equipped for a program of mixed farming.

This self-sustaining unit represents a decided advance in method over many of the older colonies, which too often adhered to one kind of crop, buying their staple foods with its proceeds.

Of Palestine's 760,000 inhabitants, three-quarters are Moslem. The remaining quarter is composed about equally of Christian and Jewish elements, while among the last named there are something like 18,000 agricultural colonists. Their settlements lie in part toward Lake Tiberias and in part along the coast between Haifa and Jaffa.

We were able to continue our coastwise journey to the foot of the Mediterranean by connecting at Ludd (Lydda) with the British strategic railway, built in 1917 by Allenby's northward-marching army and now a permanent asset of the country.

At El Kantara we descended from the train and crossed the Suez Canal by bridge into Egypt. That night we slept at Port Said. Next morning

* See, also, "Flying Over Egypt, Sinai, and Palestine," by P. R. C. Groves and J. R. McCrindle, in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1926.

Photograph by Maynard Owen Williams

A STALKING, OUTSTRUNG CAMEL TRAIN SILHOUETTES ITSELF BETWEEN YELLOW SANDS AND TURQUOISE SEA

before sunrise we were at the quay to catch our westbound liner.

One of us, who had paid a "refundable" five-dollar import tax on his typewriter at El Kantara, presented the receipt to a smiling customs official. This gentleman took up the receipt and issued another, which he handed, bowing, to our friend.

"But where's my refund?" gasped the American.

"Refunded," explained the official, with a caressing gesture. "You have now paid the export tax; that is all."

Our protests were interrupted by a second smiling official. "Will the ladies and gentlemen please step this way to the Fumigation Bureau?"

"Fumigation! But, monsieur—!" But, despite the ladies' outcries, our party was led before yet other smiling officials. The process was simplicity itself. They merely signed, stamped, and pressed upon us certain documents, purring cheerily, "Formalities waived. Fumigation certificates, ten shillings apiece!"

AT LAST WE CORNER "THE LEVANT"

As we got aboard the tender, bidding farewell to the fascinating East—fascinating even while it "fumigates" you of your dollars—there climbed in no one less than our old friend, the skipper of the *San Giorgio,* which lay berthed opposite our liner.

"Sorry we didn't see the Levant with you," we told him.

He stared.

"But—Constantinople to Port Said—you have seen it," he said. And then *we* stared.

"What do you mean by the Levant?" we demanded in chorus. He began to explain it, as everybody else had, with a horizon-embracing gesture. But we pinned him down.

"*Il levante,*" we say in Italian. "What you say in English? Ah, 'the sunrise!'" And he grinned, pointing eastward to where, across the desert, the glow was breaking through the gray.

And then we understood.

Yes, there it was, the same glow we had beheld from Stamboul's minaret and from Smyrna's gulf; the message which Rhodes' bronze Helios flashed seaward two thousand years ago; the sight which comes to Greek and Turk from over Asia Minor, to the Cypriote from over Syria, to the Lower Egyptian from over Palestine. That trio, the rim of the golden cup from which the dawn spills over into the Mediterranean, has always been for its peoples the Levant, "the shores of sunrise."

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AMONG THE BETHLEHEM SHEPHERDS

A Visit to the Valley Which David Probably Recalled When He Wrote the Twenty-third Psalm

By John D. Whiting

Author of "From Jerusalem to Aleppo," "Village Life in the Holy Land," "Jerusalem's Locust Plague," and "The Last Israelitish Blood Sacrifice," in the National Geographic Magazine

PALESTINE, the background for most of the Bible story and history, has been called "The Unchanging East," but steam and motor are supplanting the camel, the ass, and the "two women at the mill"; tractors are taking the place of the ox and ass yoked to the crooked, oaken, one-handled plow; mechanical reapers are supplanting the sickle, and the airplane now flies with the eagle.

But the shepherd life of the Holy Land has remained unchanged since the days of Abraham and of the first Christmas.

The natives of Palestine are composed of three distinct classes. Their homes, food, clothing, and customs are dissimilar, but they are united by language and tradition.

The Bedouin tent-dweller is a nomad and warrior; to him flocks and herds are a main source of livelihood. The *fellah*, or peasant, is a farmer, living in a stone house, huddled with others in a village. To him flock-raising is an integral part of his occupation, varying in importance with the location of his village. The *madany* class, living in walled cities and open towns, is made up of the artisans and merchants. Few city folk keep flocks; those that do are the local dairymen. It is the peasant shepherd with whom this narrative is concerned.

THE YOUNGEST BOY OF THE FAMILY TENDS THE SHEEP

The peasant shepherd boy is usually the youngest male laborer of the family. As the oldest son grows up to help the father with the sowing, plowing, reaping, threshing, and olive picking, a younger takes his place with the flock; and so on down the line until the lot of being the family shepherd finally falls to the youngest. Thus it was with the youth David, who, even when in later life he became psalmist and king, failed not to recall his boyhood shepherd days, and in thinking thereon to weave their romance into his sublime poetry.

The shepherd boy wears a simple robe of cotton; this is strapped around his body by "a leathern girdle about his loins"; and still, like John the Baptist in the Wilderness, has his raiment or coat of camel's hair or of coarse handspun wool.

This *aba*, or outer garment, is warm, sheds the hardest rain, and takes the place of a blanket. When the youth is out with the flocks at night he wraps his aba about him and, with a stone for a pillow, sleeps like Jacob of old, at Bethel. No wonder, then, that Moses, the lawgiver, commanded that "if thou at all take thy neighbor's raiment to pledge, thou shalt deliver it unto him by that the sun goeth down: for that is his covering only, it is his raiment for his skin: wherein shall he sleep?"

MEN AND BOYS SPIN THEIR OWN YARN FOR COATS

Not the women, but more especially the men in their leisure hours, and the shepherd boys, as they lead the flocks on the mountains, spin the long, coarse wool into yarn for their own coats.

That the spinner spins as he walks along precludes the use of a wheel; even the simple spinning wheel of our forefathers is beyond the ingenuity and needs of a fellah. A small contrivance of oak wood, into which he can wind the yarn like a ball, suffices. He gives the ball a dexterous whirl, and it spins about, twisting the separate wool strands into a coarse yarn.

The yarn is taken to the village weaver. Most of it is a natural white; a smaller portion is of undyed black to produce the customary wide stripe. In making the better and finer garments, the cloth is woven wide enough for the required length of the aba.

Sewn together sleeveless, of a single straight strip of goods, we are reminded that after the Crucifixion, the Roman soldiers divided the garments of Jesus; but on his coat they cast lots, not being willing to rend it, for "the coat was without seam, woven from the top throughout."

The *kaffiyeh* is the shepherd's headgear—a square of white cotton, folded across the corners into a triangle and made secure by a thick double black cord of goat's hair (see Color Plate XV). This head covering is doubtless as old as the Bible stories.

While the peasant folk often go barefooted, the women carrying their shoes in their market baskets balanced on their heads, the shepherd boy is always well shod, as through "thorn and briers" he must travel, over rocky mountains and across deep valleys.

These peasant shoes are made of "rams' skins dyed red," the soles are of untanned camel hide, and each shoe has a leathern latchet to fasten it. The Hebrew word translated in our Bible as "shoe" is *naal*, the identical word which the present Arab uses for a kind of primitive sandal worn by the Bedouin shepherd boys.

THE SHEPHERD'S BAG AND SLING

The shepherd is specially accoutered for his work. His equipment includes as indispensable accessories the traditional "rod and staff"—the first a light stick or crook, the second a long heavy cane. Tucked into the leathern girdle or slung across the shoulder is the *jrab*, a shepherd's bag or scrip, such as that carried by the ruddy youth David, who, leaving his father's sheep behind him, "chose him five smooth stones out of the brook, and put them in a shepherd's bag which he had, even in a scrip; and his sling was in his hand: and he drew near to the Philistine."

The jrab is made of a small kid skin, removed from the carcass without splitting it open. The leather of the hind legs is slit and braided and then knotted together at the ends, so as to form a long loop by which to carry it. In this scrip the boy puts his bread and olives or other food for the midday meal; also flint, steel, and tinder for striking fire. Besides, he may have a simple knife of Nazareth make, the curved blade folding into a slot cut into a handle of ram's horn.

Every shepherd boy carries a sling, which he has made by cutting a tuft of long wool from the back of the sheep, spinning it into yarn while resting during the noon hours, and weaving a short, narrow web. The ends are braided into cords about a yard long and the simple sling is complete.

With this sling the shepherd can drop a stone beyond a wandering sheep which does not heed call or cry; with it he can drive off an attacking beast, and while he toys with it during the long hours of watching over the flocks, he relies upon it as the main weapon of defense in case of need.

Practicing at slinging, the shepherd boy shortly becomes an expert marksman, like the left-handed Benjamites of old, who "could sling stones at an hair breadth and not miss."

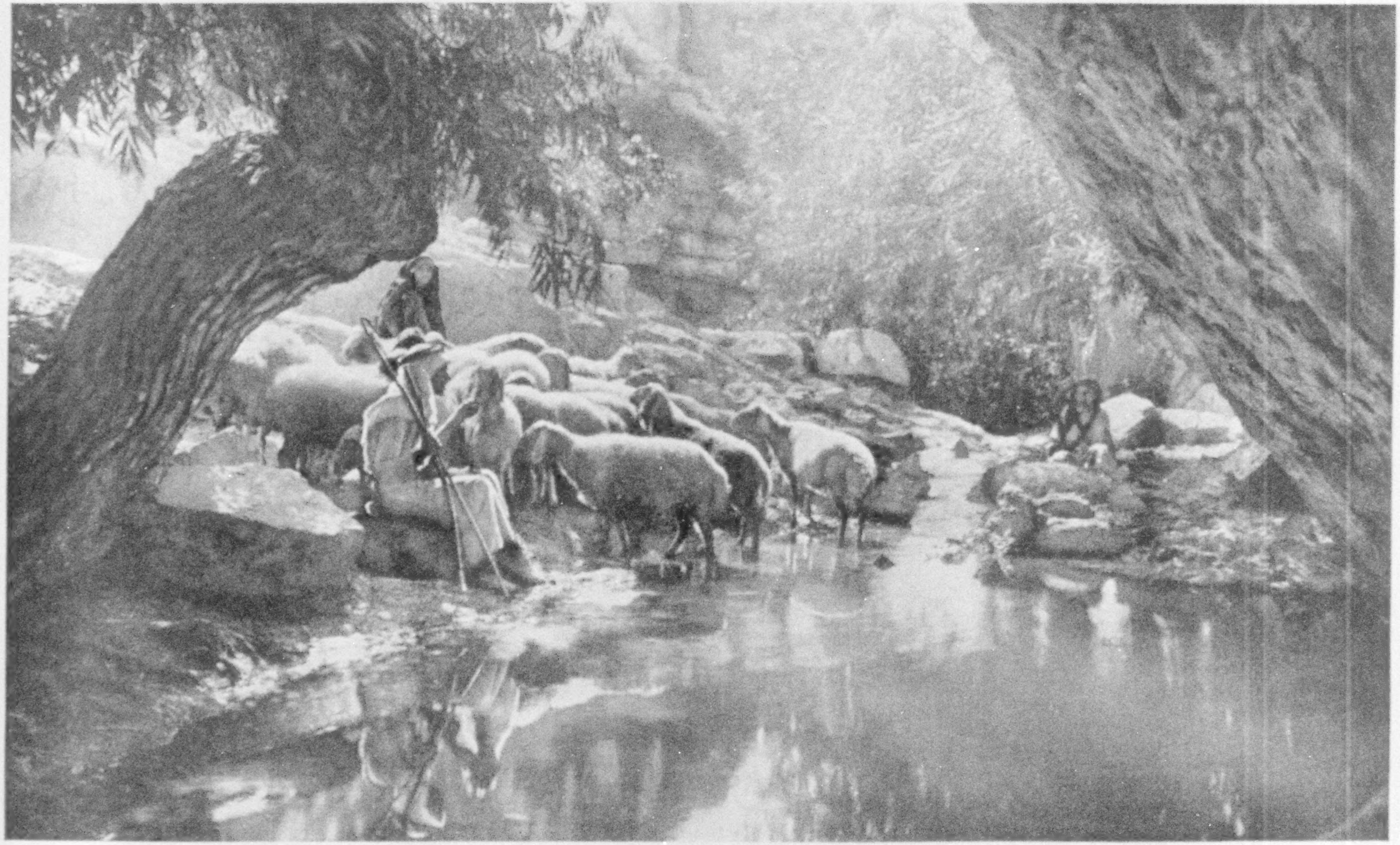
THE SHEPHERD'S FLUTE

The shepherd boy has another toy, if we may thus designate his *nayeh* or *zamoora*, a double flute made of reed. The two pipes, each punched with six holes, are bound together with wax and cord. Two smaller sections of reed, about an inch and a half long, with slits cut like an organ reed, inserted into one end, form the mouthpieces (see illustration, page 749). A doleful tune of only a few notes is produced; but, simple as it is, it is capable of stirring the heart of the peasant.

That David piped to his flocks on this simple instrument, as do the Bethlehem shepherd boys to-day, there can be no doubt. The Hebrew word for psalm is *mizmor*, which is the same as the present-day Arabic word *mazmoor*, which means simply "played on a zamoora."

Watch with me, if you will, as company after company of peasants passes by our home on the way to Jerusalem for the annual feast of the Passover. Up to a few years ago they trod remnants of a cobblestone Roman highway, now covered deep under a modern motor road. Over this very cobblestone route Paul traveled when on his way to Damascus and conversion.

These companies of merrymaking peasants are all bedecked, especially the women, in colorful attire. Their heavy, white linen dresses and large head veils are literally covered and weighed down with silk embroidery of scarlet, orange, green, and



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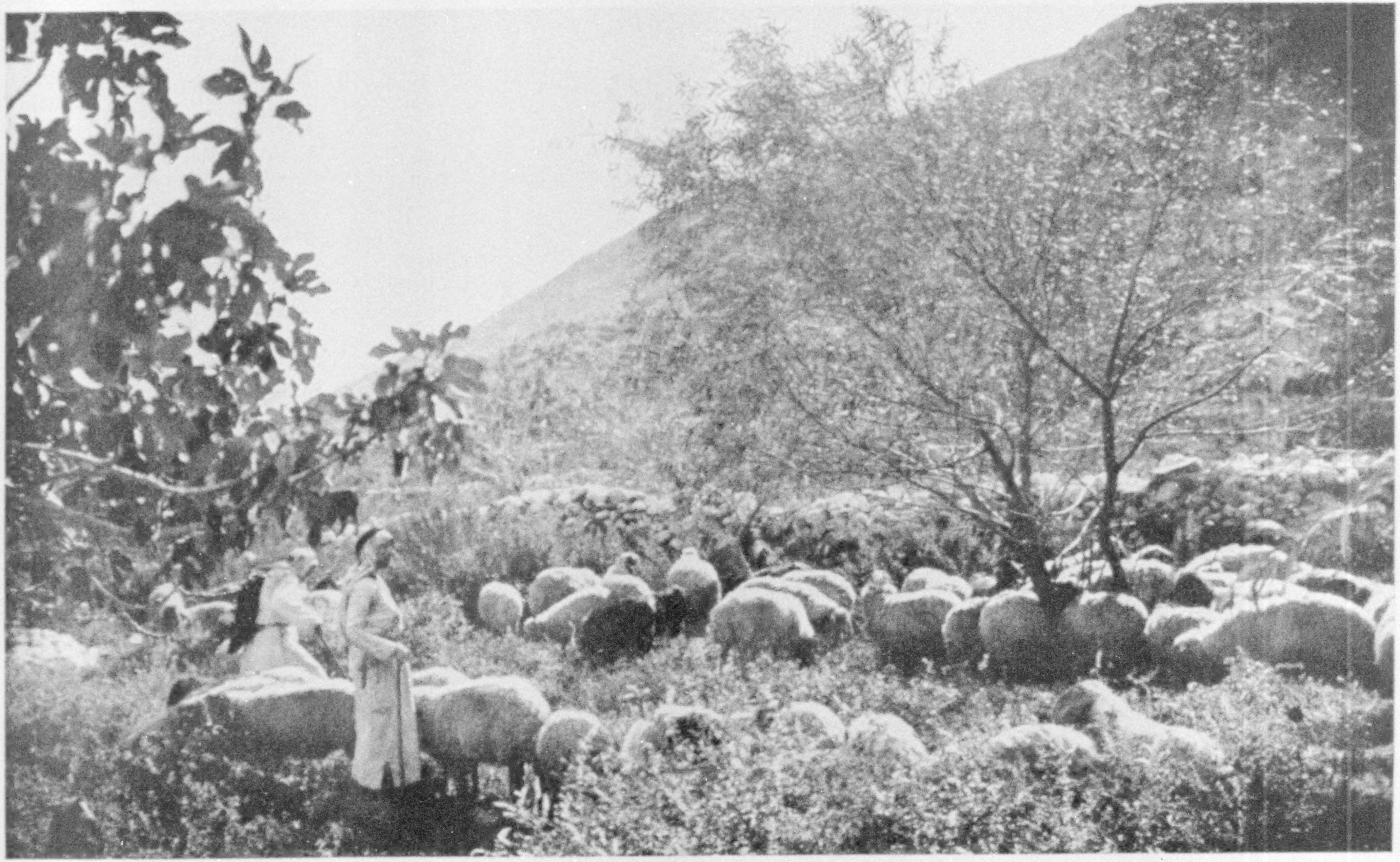
The Lord is my shepherd; I shall not want.



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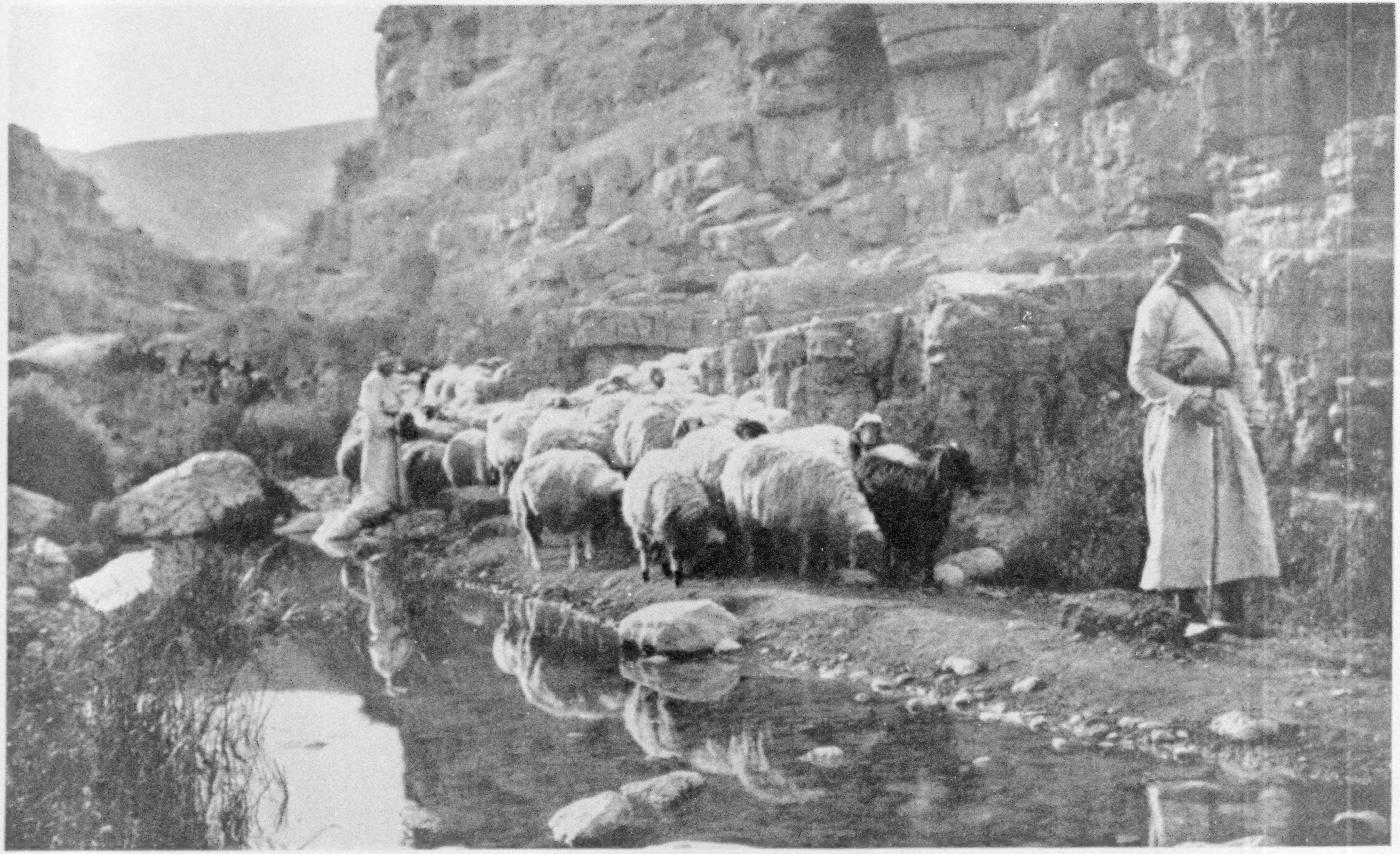
He maketh me to lie down in green pastures:



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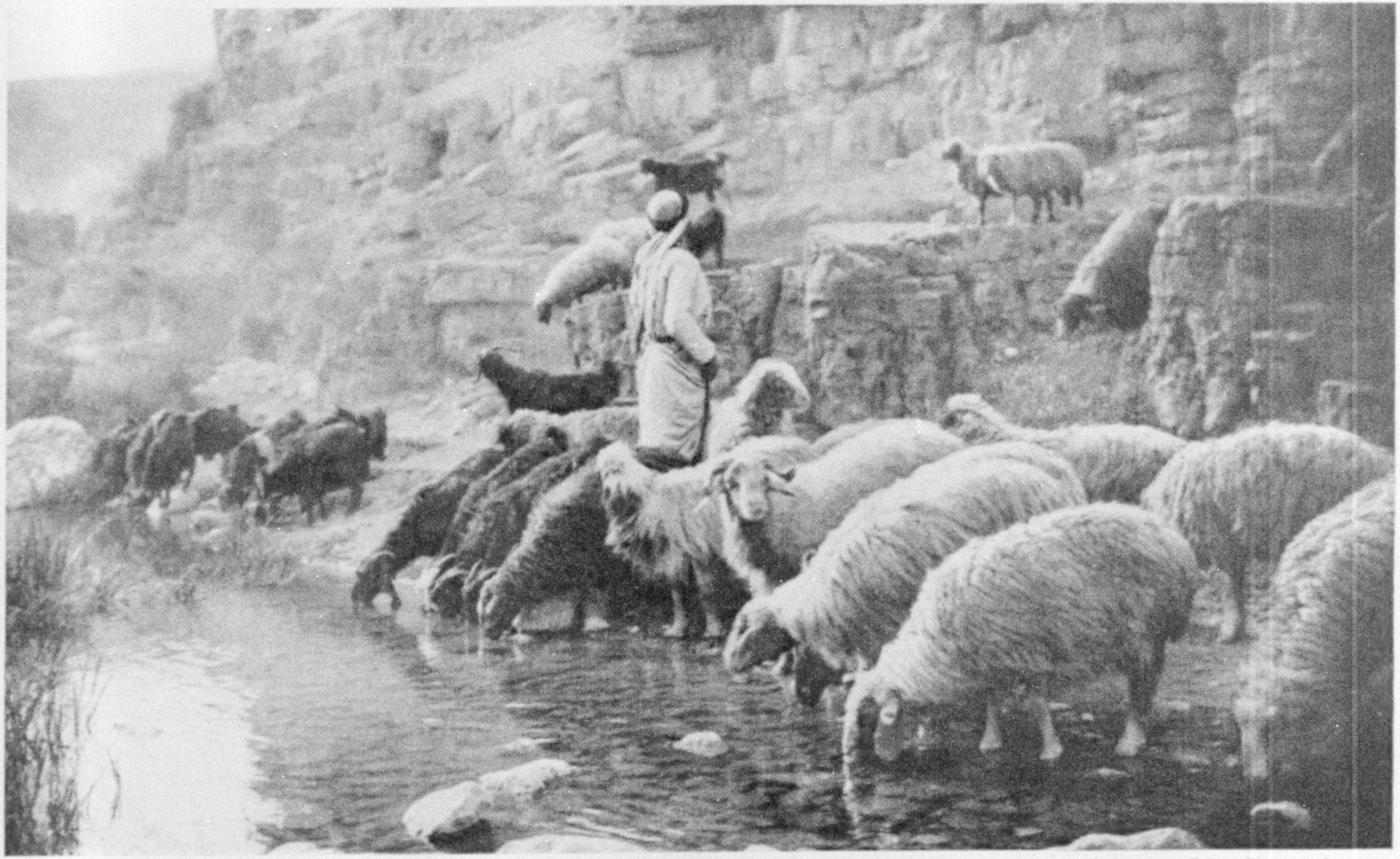
He leadeth me beside the still waters.



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He restoreth my soul:

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He leadeth me in the paths of righteousness for his name's sake.

gold (see Color Plates I, III, VIII, XII, and XIX).

All faces are aglow with the joy of anticipated merriment. The women follow behind and join in song with the men, who are dancing to the accompaniment of the zamoora. The musician now and then turns around, faces his company, and by his swinging motions and the shriller notes of his pipe, exhorts them to greater effort in dance and song.

We forget the twentieth century for a moment and see before us David and the elders of Israel bringing up to Jerusalem for the first time "the ark of the covenant of the Lord out of the house of Obed-edom with joy."

In the psalm which David composed for that very occasion we find the following refrain: "Sing unto Him, sing psalms unto Him."

We can imagine David joyously dancing before the ark, perchance with the zamoora of his shepherd days in his mouth, and thus with inflated cheeks inspiring his followers to the singing of the psalm of praise, exactly as the shepherds and peasants are now singing and dancing to the tune of the simple reed pipe.

It was this outburst of joy that caused David's wife, Michal, the daughter of Saul, to "despise him in her heart," not because the practice was an uncommon one, but probably because to her, daughter of a proud king, it was not sufficiently dignified for the king of Jerusalem, and savored too much of the humble peasant and shepherd.

Primitive, then, as this reed instrument is, it has played a great part in Biblical history, undoubtedly inspiring David to the composition of many beautiful psalms.

MOST PALESTINE VILLAGES ARE SITUATED ON MOUNTAIN SLOPES

Villages are the homes of the agriculturists. Unlike American farmers, those of Palestine live in huddled hamlets and till their many small strips of land scattered round about.

The homes of the village shepherds are mostly located on the mountains, and therefore their houses are built of stone—stone walls three to four feet thick, like miniature castles; stone domes for ceiling and roof, stone flags for pavement. Aside from a sturdy wooden door, hung on wrought-iron hinges, with wooden lock and key, and a couple of wooden shutters for the tiny windows, stone and mortar are the only building materials used, except on the plains, where stone is scarce, and sundried brick takes its place.

THE MANGER IS IN THE HOME

Inside the large one-roomed home, with its high, thick walls, the fellah builds, half across the back, a *rowyeh,* a sort of mezzanine floor, over a series of small domes, supported on short pillars. This elevation, reached by steep, narrow steps, is the abode of the family. Beside the small windows, with their iron bars, opening out from this higher level, there is an open hearth and chimney.

Here we find a row of handmade, sundried clay bins containing wheat, barley, lentils, figs, and raisins for the winter food supply; also large jars of oil. Behind this row of bins is stored fodder for the animals.

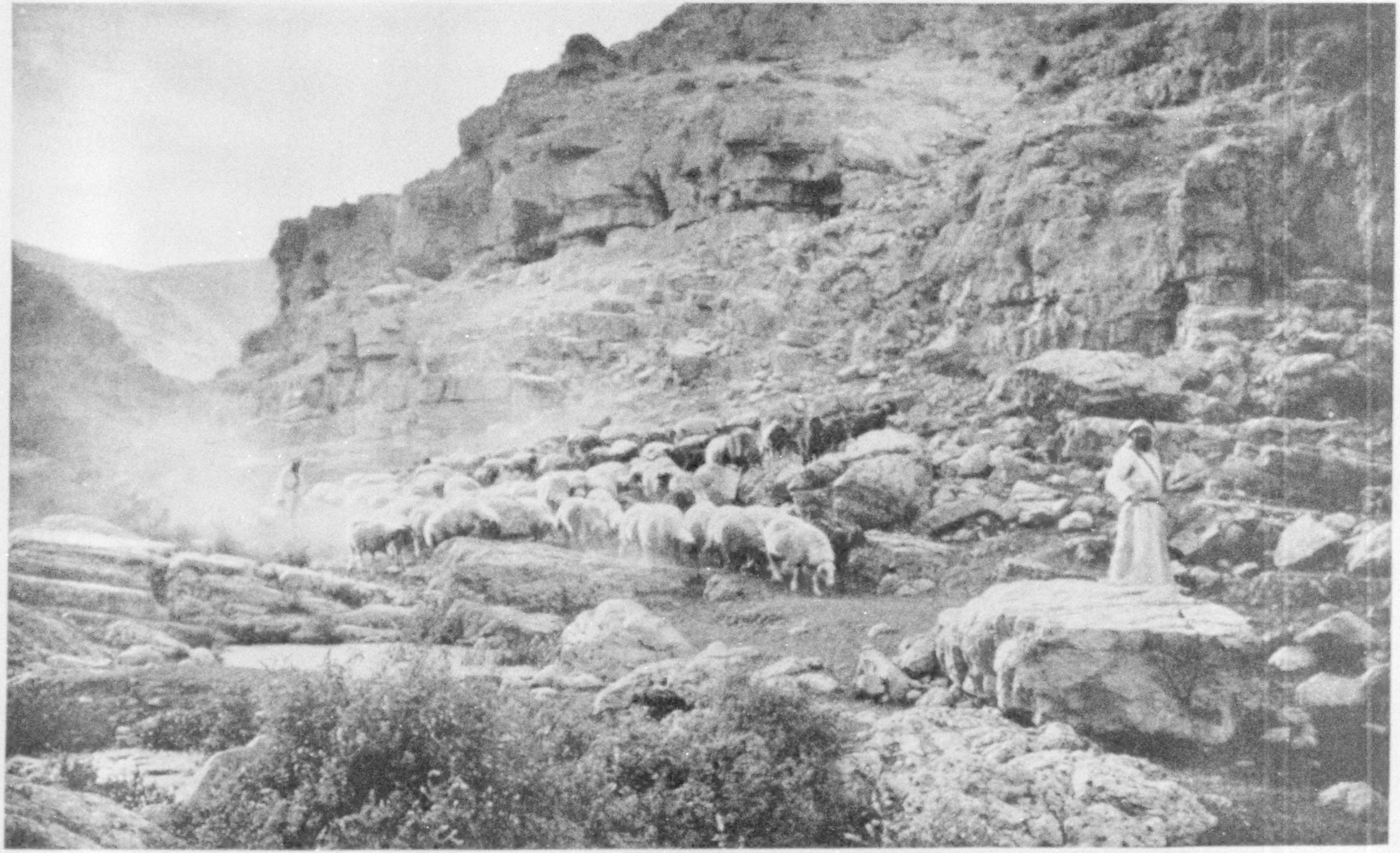
In a recess in the wall is a pile of bedding, folded up during the day and at night spread out on the mat-covered floor.

Of special interest is the lower level of the house—the stable portion of the home. Along the walls are ranged stone mangers, to which are tied the plow oxen, milch cows, and the inevitable camel. Beneath the rowyeh are the quarters for the flocks, partitioned off from the rest of the cattle by piles of thorn bushes collected for the winter fuel.

We leave the street or narrow winding lane, along which the village homes are huddled, and enter one of the houses through the sheepfold, or courtyard. This consists of a small plot in front of the house surrounded by a high wall of masonry, or more often of loose rubble, pierced only by a single door, not a gate; for the entrance is arched over or spanned by a stone lintel, so that the wall can be built up higher for better protection.

After a rainless summer, when all is parched and dry, the winter sets in with its showers, its occasional terrific storm of rain and wind, now and then a lashing hailstorm, and with snow flurries sometimes years apart. But these stormy days are interspersed with periods of springlike sunshine and warmth.

During this season the shepherd finds scant pickings for his flock on the rocky



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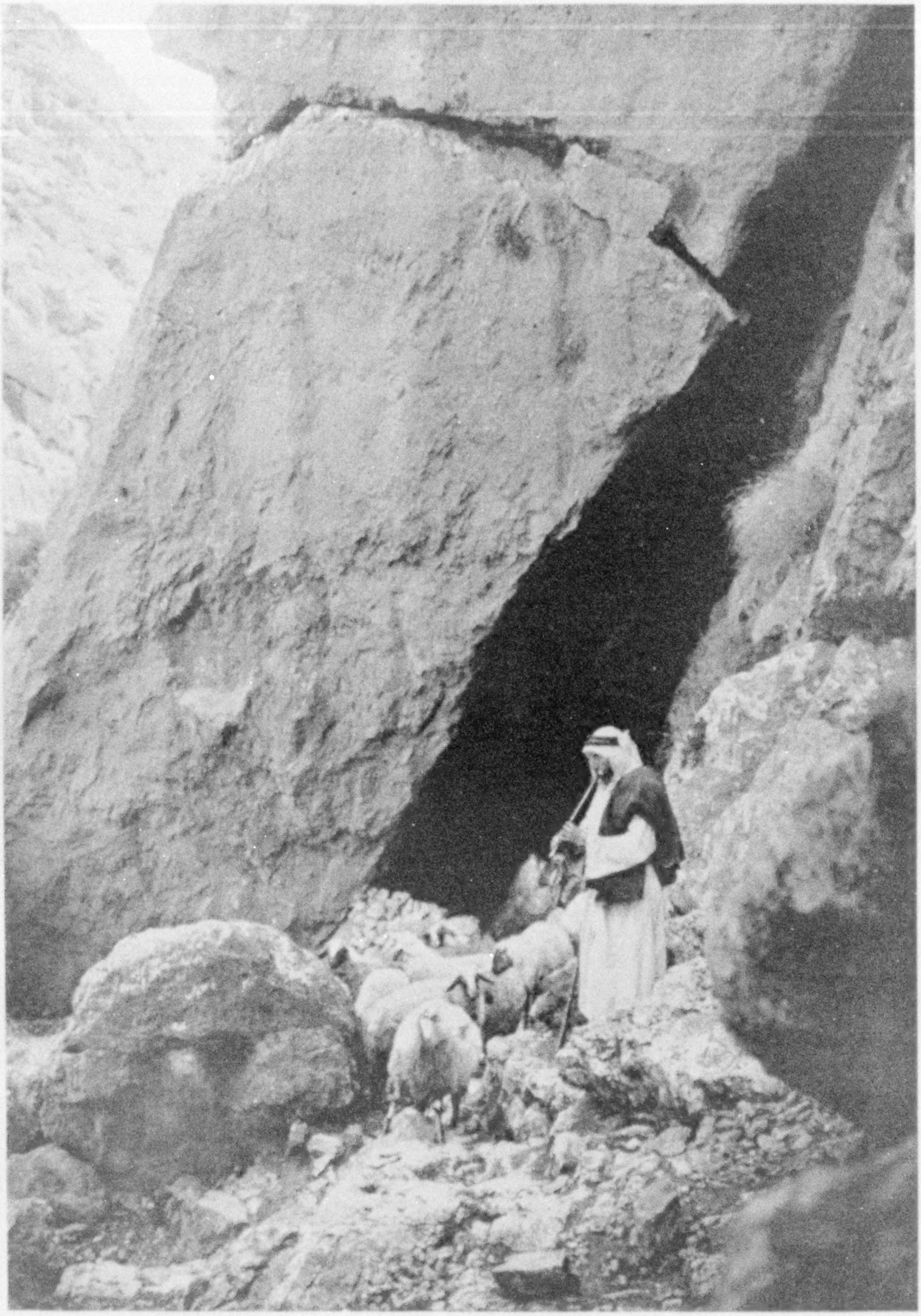
Yea, though I walk through the valley of the shadow of death,



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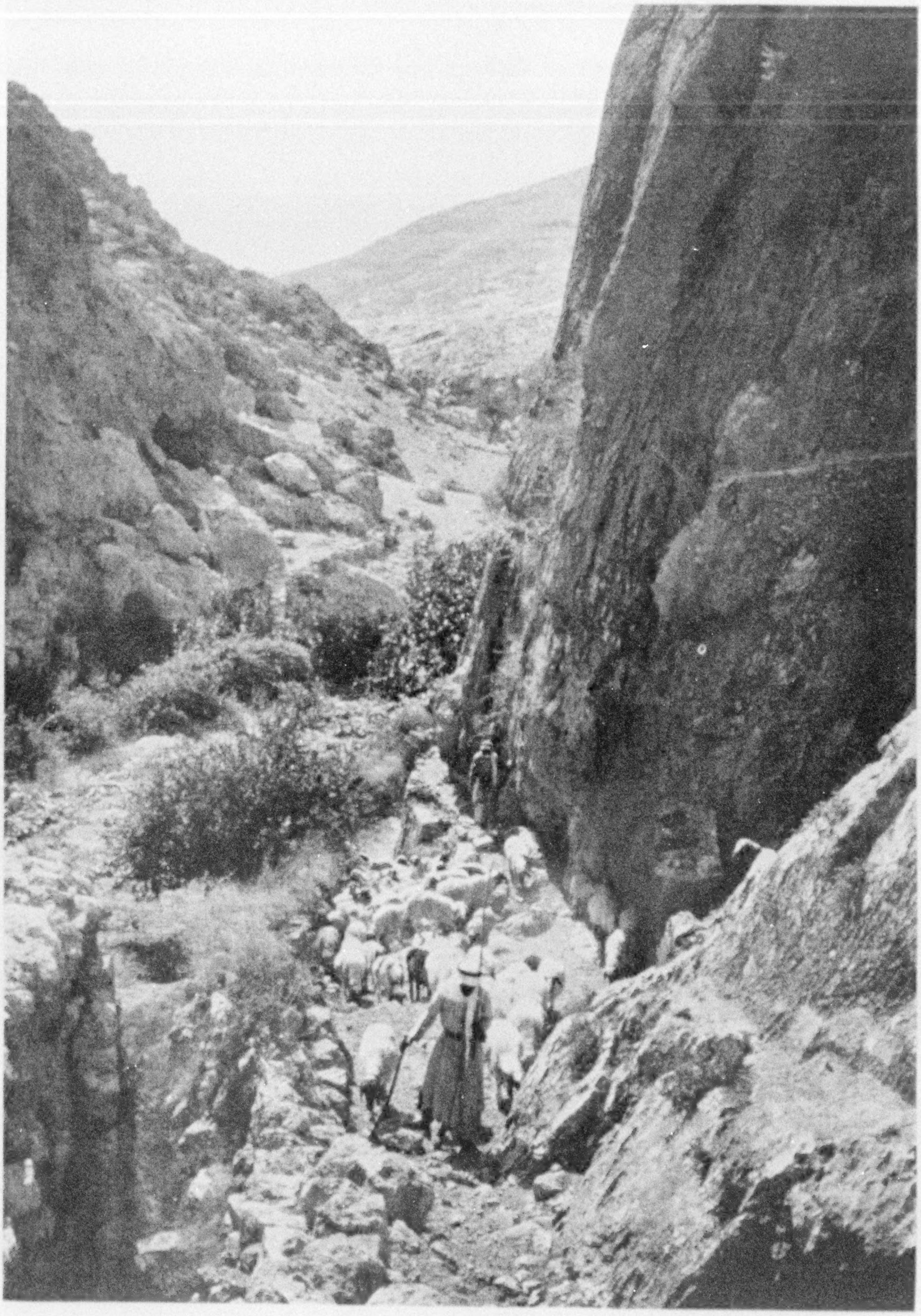
I will fear no evil: for thou art with me;



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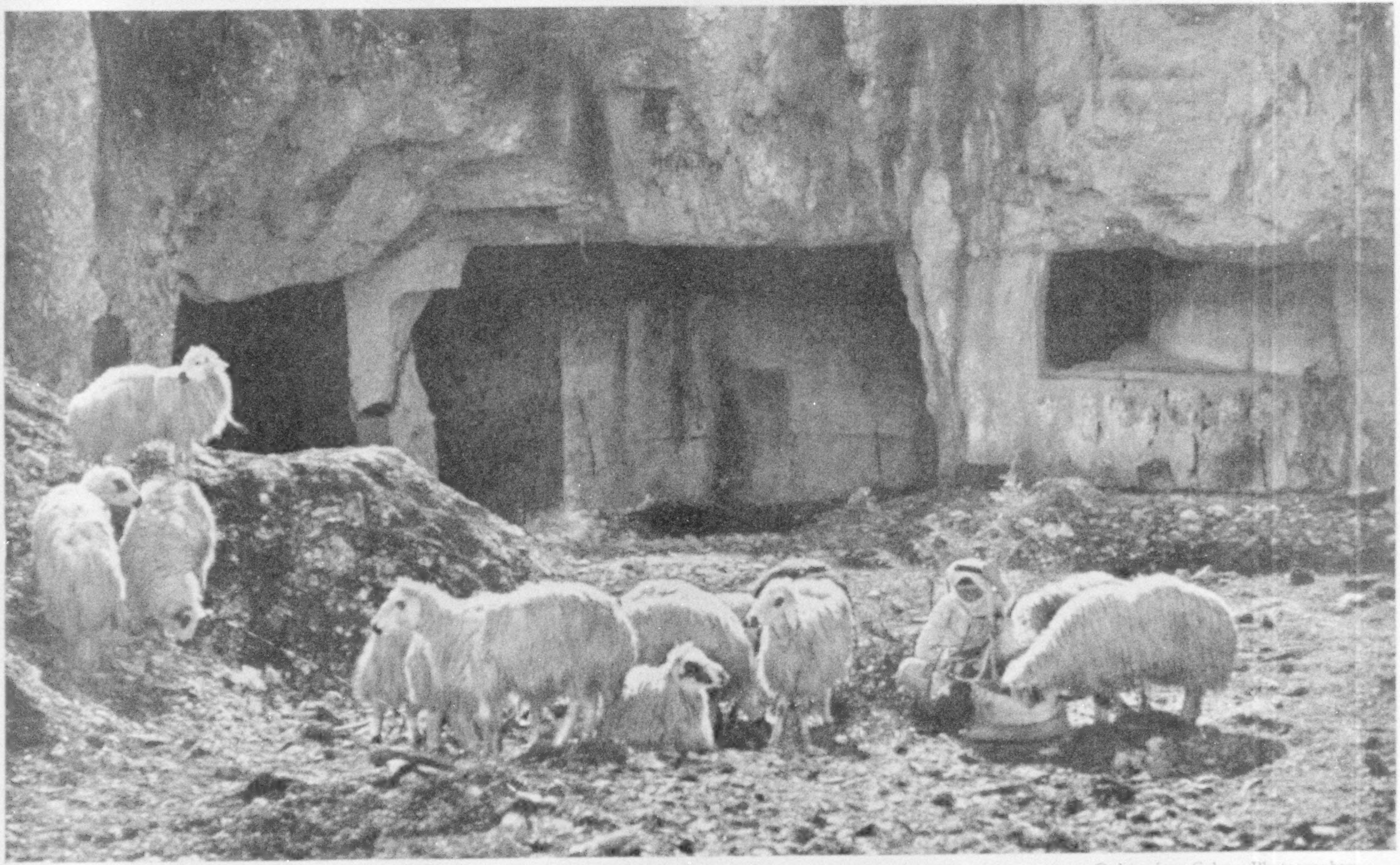
Thy rod and thy staff they comfort me.



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Thou preparest a table before me in the presence of mine enemies:

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Thou anointest my head with oil;

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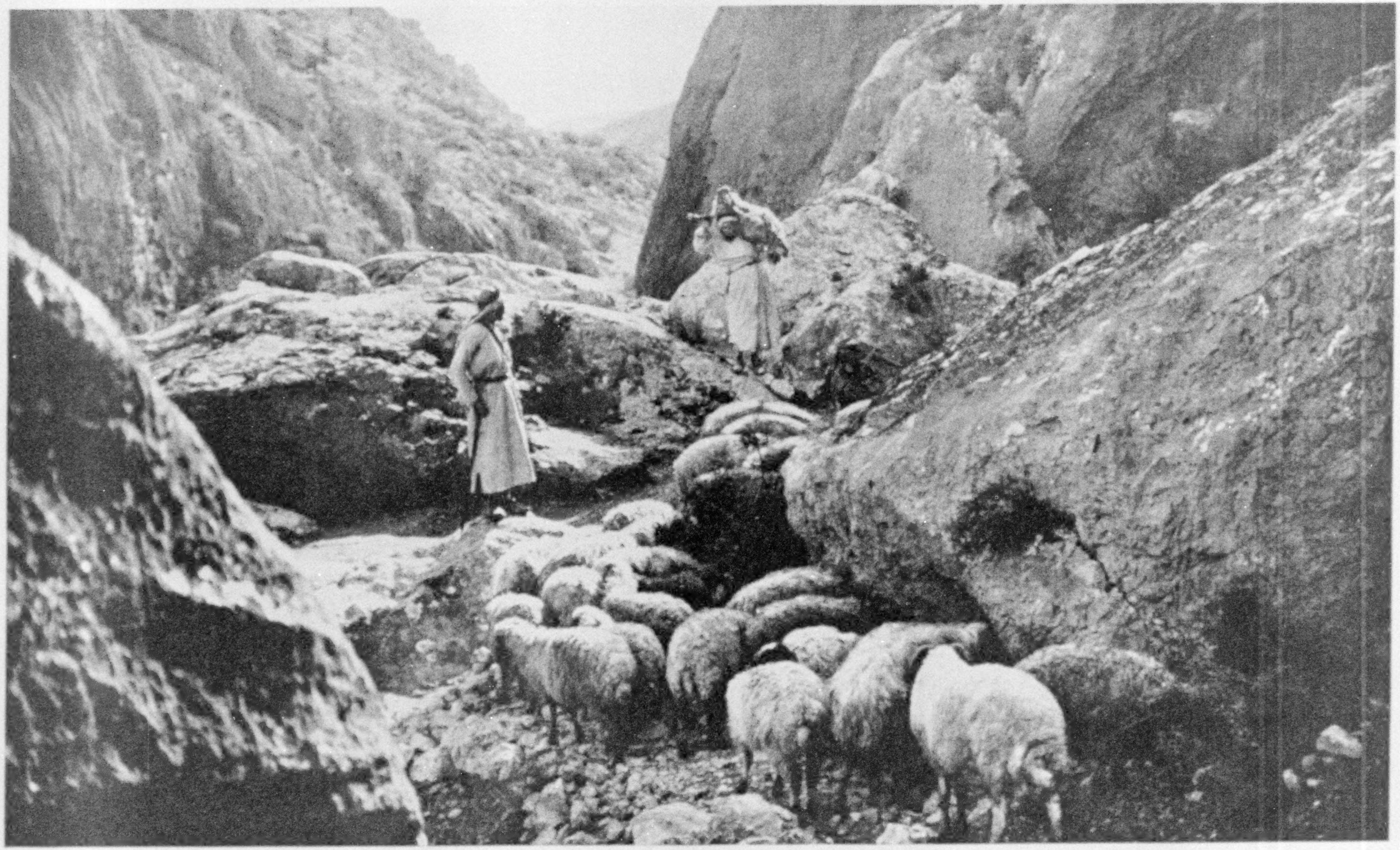
My cup runneth over.



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Surely goodness and mercy shall follow me all the days of my life:

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And I will dwell in the house of the Lord for ever.

mountain sides, and however warm and pleasant the day may be, the nights are always cold and raw; so the sheep are stabled in the house below the rowyeh.

As spring approaches, the rainstorms change to showers, the grass shoots forth, the flowers bloom. The sheep are sheared, and, since their quarters in the house have become too warm, they are kept during the night in the sheepfold.

Spring, with its abundance of green pastures, passes; the lambs are born; the harvest time approaches; then the grain is reaped. Following the reapers are the gleaners, the destitute of the village, who, like Ruth, the Moabitess, are still, according to the Biblical injunction, never debarred from the harvest field.

After the gleaners comes the shepherd with his flock.

Amid the freshly cut stubble, succulent growths are found; also dried, but tender, blades of the wheat or barley; but, best of all, the sheep find, deep down in the stubble, many an ear of grain dropped by the reapers and passed over by the gleaners.

These nourishing pickings are soon gone, and in the desert places the good shepherd now seeks summer pasture.

Thus, during the spring and harvest, the shepherd stays around his home village. In the morning we find him leading forth his flocks to the harvest fields; at noon we see him leading on to water.

ON GUARD AGAINST THE PALESTINE BRIGAND AND CUTTHROAT

At night, wrapped in a sheepskin coat and his unchanging aba, the youth sleeps on the flat roof, from which point of vantage he can see the sheep in the fold, peacefully chewing their cuds, at any time of the night; for, although they are surrounded by high stone walls and the single door is securely locked and barred, he knows that thieves are always to be feared, and therefore is constantly on the alert.

Unlike modern bandits, the Palestine brigand or robber is a petty thief, and to him lock-picking is an unknown art. So about the door the shepherd has little concern; he knows that "he that entereth not by the door into the sheepfold, but climbeth up some other way, the same is a thief and a robber."

Despite all the vigilance and precautions taken, often on a dark night, when the shepherd is overcome by deep sleep, the marauder scales the wall, and after cutting the throats of as many sheep and lambs as he can, slings them over the wall to his confederates and escapes.

"The thief cometh not, but for to steal, and to kill, and to destroy," said Jesus in his shepherd parable, as related in the Gospel according to John. Here the Savior uses as a background for His lesson the sheepfold and depicts Himself as the Good Shepherd. He speaks of His own sheep knowing His voice and not following a stranger's.

THE SHEPHERD'S DAY

It is early dawn. After placing in his leathern scrip some small flat loaves of bread, a bit of cheese, some home-grown and home-cured olives for breakfast and the midday meal, the shepherd unbolts the door. "He calleth his own sheep by name and leadeth them out. And when he putteth forth his own sheep he goeth before them, and the sheep follow him."

To-day, as in the parable, the good shepherd never drives his sheep; he leads them. If the reader visits these historic lands, he may encounter a man driving sheep, but he may be sure that such a shepherd is only a "hireling."

At the close of day, as the flock nears the sheepfold, the shepherd runs ahead of his bleating charges, eager to enter their home. He plants himself in the doorway, counts the sheep one by one as they "pass under the rod," which is used in driving away any animal not of the flock, for often a street dog tries to take advantage of the open door. "I am the door: by me if any man enter in, he shall be saved, and shall go in and out, and find pasture," said Jesus in his parable.

This present-day method of taking advantage of a narrow place to get the sheep, one by one, to "pass again under the hands of him that telleth them," is often mentioned in the Scriptures. It goes back to the days of Moses on Sinai, when, concerning the tithing of the herds and flocks, he alludes to thus counting them.

There is a type of sheepfold, rarely to be seen nowadays, which illustrates the description of the Last Judgment, found

in the twenty-fifth chapter of St. Matthew. In it the shepherd builds across the sheepfold a partition, lower than the surrounding walls, but still a complete barrier, so far as the animals are concerned. He has a large flock, both of sheep and goats, and during the day the black goats, with their long ears and horns, mingle freely with the sheep, which almost invariably are white and hornless, except for the males. At night, however, upon reaching home, the shepherd "divideth his sheep from the goats," placing the latter in a separate pen; for he explains that, since the goats are of a restless, fighting disposition, they are excluded from the sheepfold.

Throughout the Bible, in which the Eastern custom of conveying a thought by means of a parable is so frequently employed, the simile of shepherd and sheep is freely used. Among Old Testament writers David, perhaps most of all, used this theme, for he had started life as a shepherd. We find his Psalms sprinkled with many an allusion to the shepherd and flocks, and he has devoted an entire psalm to the subject (see pages 731-744).

NATURE CONSERVES THIS DESERT GRASS FOR THE SHEEP

Through a deep depression the River Jordan flows the full length of Palestine. It rises by the Hill of Dan and empties into the Dead Sea, 1,300 feet below the level of the Mediterranean. This is the lowest spot on the surface of the earth.

All along the western side of the Jordan Valley is a semi-arid wilderness, treeless and wild, which divides the cultivated mountains of Judea, with their sprinkling of olive and fruit orchards, expanses of vineyards, its barley and wheat fields, from the more fertile Jordan Valley. Lot, in separating himself from Abraham, chose this valley, while Abraham remained in the mountains around Hebron.

This desert, as in Bible times, is still called the "Wilderness of Judea." Into it the yearly "scapegoat" was set loose, and here John preached and baptized. Its lower section is the Wilderness of Engedi, to which David fled for refuge and was pursued by Saul.

In the spring even this desert is carpeted with thick grass and sprinkled with many bright flowers, but at that time the shepherds are still pasturing their flocks around their village homes and in the harvest field. With no summer rain, the desert grass is conserved by nature into standing hay, which the shepherd depends upon for the late summer and autumn needs of his flocks.

Without house or cote, in this uninhabited land, one of two courses is open to the herder. He may club together with his fellows, grazing his flock apart by day and watching over the combined groups at night, or he may select a rocky valley where he will find a running brook and a natural rock cave for nightly abode and protection.

TWENTY-THIRD PSALM PHOTOGRAPHS MADE WHERE DAVID LED FLOCKS

Northeast of Jerusalem, bordering on the desert, is Anata, ancient Anathoth, home of Jeremiah, and still farther eastward, lying low between precipitous walls and pinnacles of rock, is Ain Farah, a tiny stream of clear water flowing between banks of summer green.

Many who know Ain Farah see this rocky oasis pictured by the Psalmist when, in his later years, he composed the Shepherd Psalm, in which he recalls the youthful care he bestowed upon his father's flock, in such surroundings of "still water," "green pastures," and deep valleys with their early shadows. But not only did David, in composing the Twenty-third Psalm, pen poetry of sublime quality; he also, in those six short verses, described the life of the Palestine shepherd a thousand years before him and which remains the same to-day, some three thousand years after.

It was at Ain Farah that most of the photographs reproduced on pages 731-744 were made, over a period of several years. The Arab shepherds with their flocks were not specially posed, but photographed at their everyday task.

AIN FARAH, THE SWIMMING HOLE OF THE AUTHOR'S YOUTH

Water in Jerusalem has always been scarce; there are no lakes, rivers, ponds, or creeks near it. For domestic purposes, the rain was caught on the stone roofs and stored in rock-hewn cisterns for the yearly supply.

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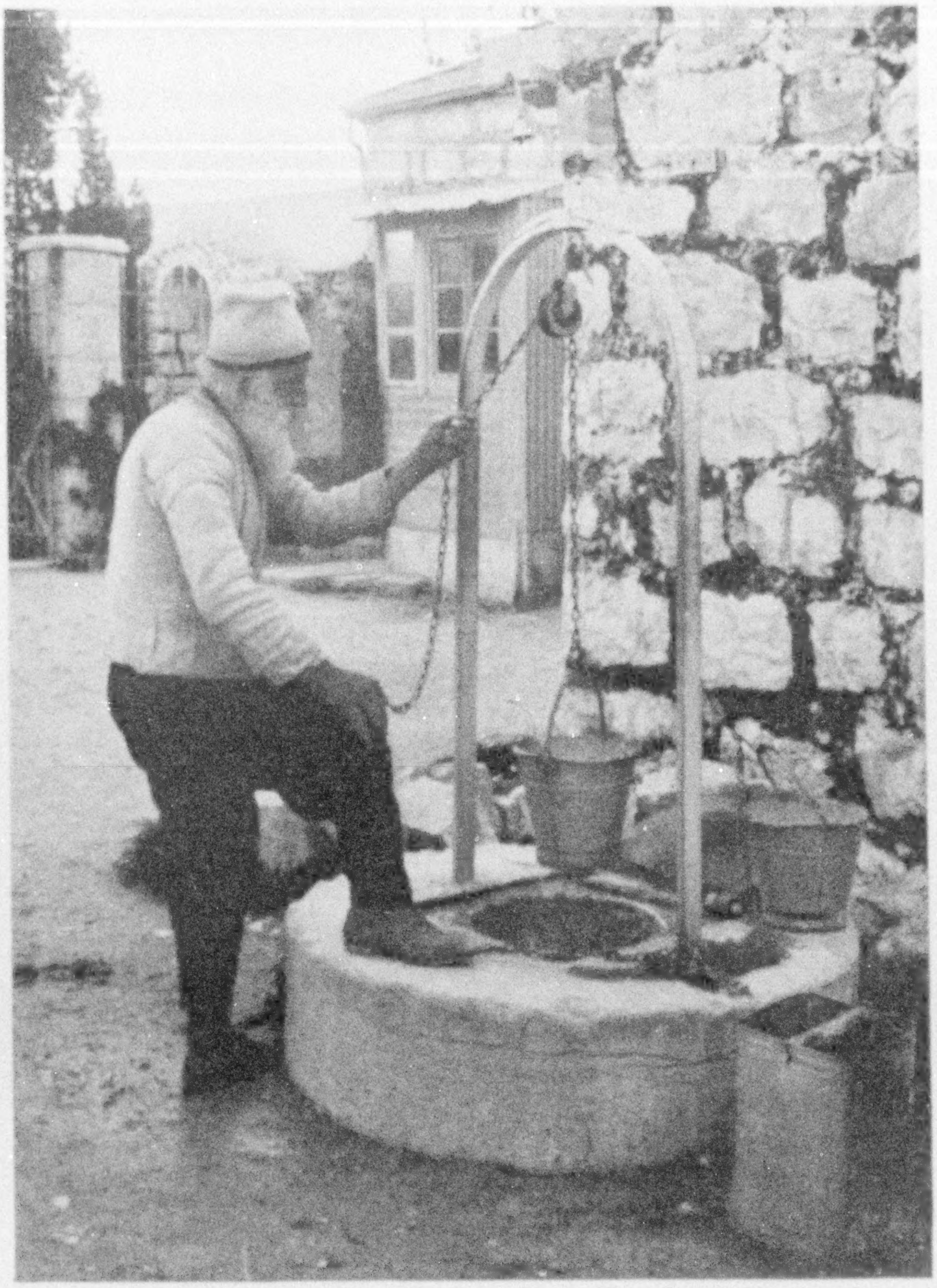
AN ARAB SHEPHERD OF PALESTINE

His headgear consists of a square of white cotton secured by a thick, double black cord of goat's hair (see text, page 730). His *aba,* or cloak, is folded up, so as to leave his legs free for climbing.



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THE PSALMIST'S WELL, IN BETHLEHEM

"And David longed, and said, Oh that one would give me drink of the water of the well of Bethlehem, which is by the gate!" (See II Samuel xxiii: 14-17).

In his boyhood days, Ain Farah, seven miles from Jerusalem, with scarce a donkey path leading to it, was the author's only swimming hole. Many a happy Saturday he has spent here picnicking in the shadow of a rock or a willow tree, and many a night he has spent in the valley. On numerous occasions, after school, he and his companions have run the seven miles there and the seven miles back just for a dip.

Forgetting the years that have elapsed, let us renew our youth and once more, as children, revisit Ain Farah.

We are awake before dawn. Along the narrow ramparts, on top of Jerusalem's old wall, we skip, and out through one of the city's ancient gates; then across the Kidron, over Olivet, we reach Anathoth, just as the sun rises over the Mountains of Moab, across the Jordan.

We take short cuts across a small plateau. Here the path is just on the brink of a precipice, there a slot cut across a sloping rock secures a footing. If one of us should slip, there would be nothing between the unfortunate and the bottom of the valley, hundreds of feet below.

SHEPHERDS' CALLS ECHO FROM PRECIPITOUS CLIFFS

As we enter the valley, it is already resounding with the call of the shepherds, which echoes from rock cliff to rock cliff. We hear the sheep bleat and the cry of the lambs in answer.

As we look up from the bottom of the valley, the sides are sheer precipices, like walls of a great cathedral, hundreds of feet high, with pinnacles of rock, like steeples, towering still higher. All is dry except the banks of the brook, which are fringed with grass and sweet flowering mint, with here and there a willow tree.

Above us, in the face of the rock and reached by winding paths, are natural caves, the nightly abodes of the shepherds.

The sky is bright and cloudless and the valley is flooded with golden light. The shepherds call to their flocks and lead them to the hilltops, where the dry grass,

despite its parched appearance, affords excellent pasturage.

The composer of the Twenty-third Psalm staged his scene in a summer setting, such as is now about us; otherwise "still waters" would not have been emphasized, for in winter the flocks do not have to be watered.

Let us follow one shepherd. About noon we notice that the sheep have stopped grazing. They huddle together, each seeking shade for its head in the shadow of another. The shepherd now leads them back into the valley. He anticipates their every need, just as the Psalmist said:

"The Lord is my shepherd; I shall not want."

Along the brook, other flocks may be watering. Our shepherd has halted his sheep in a green patch. They do not graze, but lie down to rest and get cool before being watered.

"He maketh me to lie down in green pastures."

This little brook, short as it is, passes between rock bowlders, where it swirls about in a series of small rapids. It drops over a rock shelf, forming a miniature cascade, but just beyond, where the valley widens, the waters are shallow and quiet and safe as watering places, even for the smallest lambs.

"He leadeth me beside the still waters."

Our shepherd restrains part of the flock, while others are allowed down to the water's edge, slaking the thirst of the full round of day and night, for they drink only once in 24 hours.

American Colony Photograph, courtesy Pathé

THE SHEPHERD'S FLUTE (SEE TEXT, PAGE 730)

They have been dry and thirsty, they have panted for breath, but one can imagine now,

"He restoreth my soul."

After all the sheep have been watered they rest, perchance, in "the shadow of a great rock in a weary land," and when the cooling afternoon breezes blow, the shepherd again leads to pasture.

We have already noted that the valley paths are precipitous and treacherous. As the shepherd leads the flock, he avoids dangerous places as much as possible. If a sheep should slip, he calls to Allah for protection. All along the steep sides we see low retaining walls, which have been built for the betterment of the paths, and

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THE NIGHT WATCH

"And there were in the same country shepherds abiding in the fields, keeping watch over their flocks by night" (Luke ii: 8).

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GATHERING OLIVES IN A GROVE NEAR JERUSALEM

The average peasant farmer of Palestine lives in a village consisting of huddled stone houses. He and the older members of his family cultivate their fields or work in the olive groves, while the youngest male laborer of each household tends the sheep (see text, page 729).

© American Colony Photographers

A STREET IN BETHLEHEM

More attractive than the high headdresses of the women (see illustration, page 723) are the brightly colored orange turbans of the men.

a sort of causeway of loose stones has been thrown across the brook. Such care and forethought suggest the psalmist's next line:

"He leadeth me in the paths of righteousness."

As evening approaches, the shepherd must start back for the night abode—a cavern far in between steep precipices, where the shadows are deepest.

Hidden along the path, many a wild beast still lingers, awaiting the chance to seize an evening meal. Beasts of prey must have been even more numerous in the time of David, before the days of gunpowder, when the shepherd's weapon was a sling and stone.

We follow along through the dark valley. The shepherd pipes to his sheep as he leads the way, his flocks strung out in the narrow defile. Sheep are timid creatures, and when we see them pressing close upon their guardian's heels we realize the full significance of the Psalmist's

"Yea, though I walk through the valley of the shadow of death,
I will fear no evil: for thou art with me."

Now it has grown quite dark, and the shepherd can no longer be discerned; so with his heavy staff or his lighter rod he taps this rock, now that, the sound echoing and resounding through the valley and the sheep following are reassured. Of this practice the Psalmist sings,

"Thy rod and thy staff they comfort me."

After reaching the cavern in which he is to spend the night, the shepherd secures the entrance with some thorns and brush. He builds a little fire, by the light of which he partakes of his evening meal. From a small bag he feeds a little grain to the leader of the flock to supplement the day's grazing on the mountain. When, as a shepherd, David fed a few of his sheep thus, he must have often realized that the sheep were being spied on by some ravenous beast of prey which, perchance, had its abode in an adjacent cave, yet was unable to molest his flock. Thus into his song of trust the Psalmist weaves,

"Thou preparest a table before me in the presence of mine enemies."

Early morning arrives. A sheep may have received a scratch the day before, or perhaps a lamb is suffering from the effects of the sun. The Arab shepherd believes in the efficacy of olive oil as a cure, and therefore from a horn he anoints the victim. Thus the Psalmist recites:

"Thou anointest my head with oil."

This morning the shepherd has decided to climb some of the highest peaks in search of pastures. It is too far to return to the brook, but he knows of a rain-filled cistern of cool water. From it, at noon, with the aid of a long rope and a leathern bucket, which he has carried for the purpose, he waters the sheep. He empties the bucket into a stone trough or a great circular basin hewn from solid rock, perchance the capital of an ancient column. He sings at his work and draws the water even faster than the sheep can drink; so that the trough overflows and the Psalmist writes:

"My cup runneth over."

While returning to the valley fastness for the night, a lamb goes lame. Does the shepherd discard it or leave it behind? No; he puts it on his shoulder and tenderly carries it back to the fold and tends it as best he can. Such a kindly nature is reflected in the assurance that

"Surely goodness and mercy shall follow me all the days of my life."

We cannot longer linger with the Arab shepherd of Ain Farah; we have tarried two days and a night.

We toil back. Especially stiff is the climb over the eastern slopes of Olivet. As we reach the crest, a view of Jerusalem looms before us, encircled by walls and ramparts, gates and towers, the sun setting behind golden and crimson clouds.

The Dome of the Rock greets the eye—a Moslem sanctuary, second only in importance to the Mosque at Mecca. On this site Solomon built the first temple to Jehovah. While the Psalmist never saw this temple, he had provided materials in abundance for its construction.

As the youth David returned with his father's flocks to Bethlehem, he must have seen Jerusalem often from these heights, and in composing this psalm he possibly had this view in mind, with the added vision of the beautiful temple he had long thought on and the building of which he had entrusted to his son Solomon. So, he ends the lovely psalm with

"I will dwell in the house of the Lord for ever."

Official Photograph, U. S. Army Air Corps

EQUIPPED FOR A HIGH-ALTITUDE FLIGHT

The pilot is clad in several suits of woolen underwear, his regulation army uniform, a knitted woolen garment, and a suit of leather heavily padded with down and feathers. Fur-lined gloves, fleece-lined moccasins over the boots, and goggles treated with an antifreeze gelatine complete the costume (see text, pages 760-761).

EXPLORING THE EARTH'S STRATOSPHERE

The Holder of the American Altitude Record Describes His Experiences in Reaching the "Ceiling" of His Plane at an Elevation of Nearly Eight Miles

By First Lieutenant John A. Macready

Late of the United States Army Air Corps

Author of "The Non-stop Flight Across America," in the National Geographic Magazine

BROWSING through the pages of an encyclopedia, I chanced upon an article entitled "Altitude Records," and being much concerned with this subject, I read the following paragraph with considerable interest:

"On April 15, 1875, M. Gaston Tissandier and two companions, MM. de Sive and Groce Spinelli, rose from Paris in the spherical balloon *Zenith* to a height of five and one-third miles (28,000 feet). M. Tissandier alone survived the trip, his companions dying in mid-air. He himself was rendered unconscious."

This was, perhaps, the first altitude flight of any magnitude ever made, and the fates of these gentlemen caused great speculation at the time regarding conditions in the extreme upper regions.

Many years were to elapse before flights to great heights were again attempted; then the advent of heavier-than-air craft and the exigencies of a great war made it increasingly apparent that higher and higher altitudes must be used, both because of the longer ranges being developed in anti-aircraft guns and because in individual combat, in the air as on the ground, it invariably proved to be the man on top who won the fight.

FIFTY FLIGHTS TO ALTITUDES OF NEARLY SIX MILES

So, although the same exploring instinct which actuated M. Tissandier and his companions was firmly implanted in my own breast, the reasons for my recent high altitude flights were not primarily to satisfy this instinct, nor to add to the store of the world's scientific knowledge, but to forward, through experiments, the development of a logical and necessary military program.

In prosecution of this development work, carried on by the Engineering Division of the Army Air Corps, I have made approximately fifty flights to altitudes above 30,000 feet and about ten flights to altitudes above 35,000 feet.

This high-altitude test work was begun in April, 1920. Up to that time Major R. W. Schroeder, in making an Air Service test, had gone farther into this unknown region of the sky than any other living creature. On the morning of February 27, 1920, he climbed into a Le Pere airplane which was equipped with oxygen flasks and a supercharger, an instrument used to supply sea-level pressure to the engine carburetor at high altitudes, and started on his long climb.

FALLING FROM A HEIGHT OF SIX MILES

The oxygen equipment was supposed to supply the pilot with oxygen automatically as he needed it, but when he had fought his way upward through the frigid air for one hour and forty-seven minutes and had achieved an altitude of 33,000 feet, it suddenly failed to function.

Major Schroeder had an emergency flask, and he resorted to this upon discovering that his supply had stopped. Fearing that the emergency supply would become exhausted, he lifted his oil-grimed goggles so that he might see to make an adjustment in the automatic feed and, deprived entirely of oxygen in that instant of stooping forward, he lost consciousness and fell with his plane, like a plummet, through the thin air for six miles.

The presence of oxygen in the heavier air of the lower altitudes, however, partially revived him, and instinctively he regained control of the plane. Miraculously, in his semi-conscious condition, he

Official Photograph, U. S. Army Air Corps

THE AMERICAN HIGH-ALTITUDE AIRPLANE "XCO5-A"

The supercharger and intercooler are shown on the side of the airplane (see text, page 759).

made a safe landing, his eyes full of ice and temporarily blinded by the extreme cold to which he had been exposed during his long fall—undoubtedly the longest fall of man since the famous exit of Satan from the gates of heaven.

There was a glory in this fall, however, absolutely lacking in that of his predecessor; for, although Major Schroeder spent several weeks in a hospital recuperating, he had brought down with him a new world's altitude record and valuable information upon general conditions at high altitudes and upon the behavior of plane and engine in them.

WINNING THE "ICICLE CROWN"

I was just beginning my work as a test pilot and little dreamed, as I helped lift the limp figure of the pilot from the plane to the waiting ambulance, that mine would be the shoulders upon which his cloak would later fall, or that I would one day receive from him a gay letter, requesting, "Mac, I wish that you would look over the place where I had my bad luck, and if it needs any attention polish it up a bit."

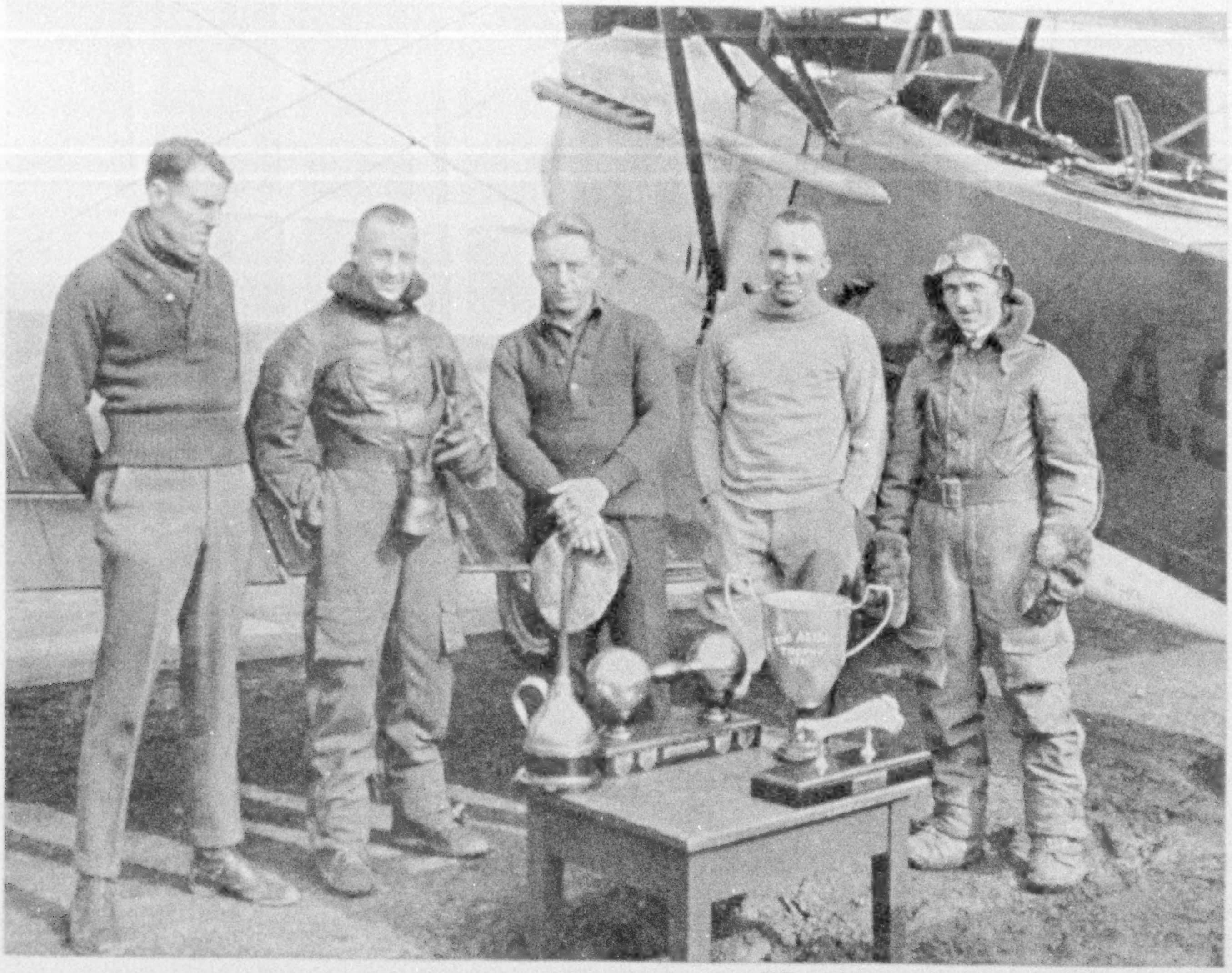
I now hold, as one of my most treasured possessions, his congratulations upon my winning from him "the icicle crown," as he put it, when I bettered his world's altitude record.

THE "CEILING" OF THE AIRPLANE, NOT THE PILOT'S ENDURANCE, LIMITS ALTITUDE FLIGHTS

It is a strange region, this air high above us, which probably through pure choice few of us will ever enter, full of treachery and danger to man, putting forth obstacles at every stage to halt his upward progress.

The general impression is that the effects of cold and hardship upon the pilot are the chief obstacles to be overcome in altitude flights.

This is a misconception which in press reports has often caused a severe jolt to my pride, for never have I descended from an altitude test for lack of physical endurance or for any reason other than the breakage of some important part of the plane or engine, or its failure to function, or simply because the plane would go no higher.



Official Photograph, U. S. Army Air Corps

TEST PILOTS WITH THEIR TROPHIES

When a test pilot injures a plane as a result of bad judgment, he is presented with the bone, the dumb-bell, or the alibi trophy. From left to right, Lieutenant Barksdale, Lieutenant Macready, Lieutenant Wendell H. Brookley, Lieutenant Van Veghten, and Ralph G. Lockwood, civilian. Lieutenants Barksdale and Van Veghten have recently been killed while testing planes.

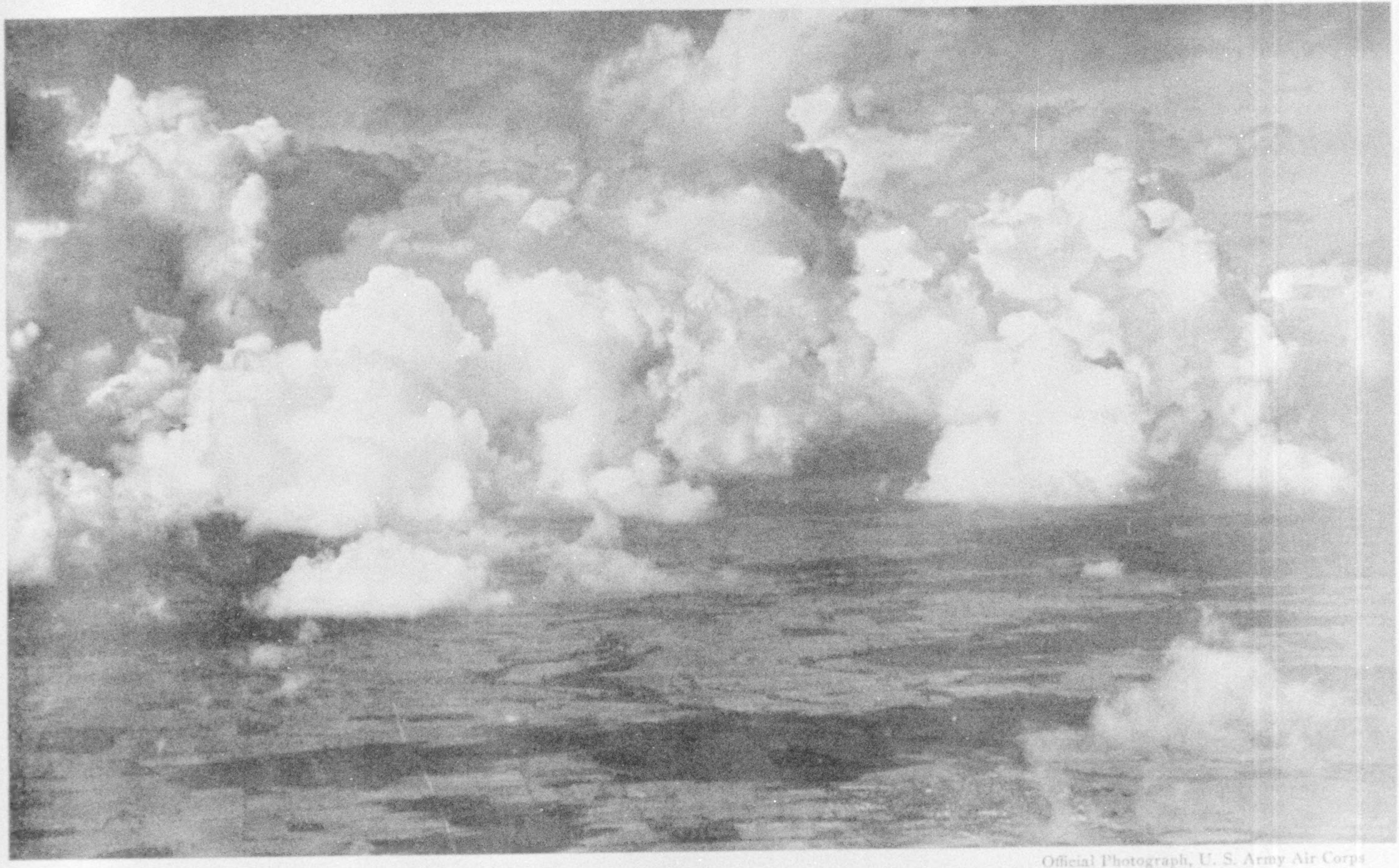
For there are times when an airplane is just that stubborn, and, no matter how one tries, it cannot be forced upward another foot. Each airplane, in fact, has its "ceiling," higher than which it cannot climb. This limit depends mainly upon the weight or load carried and the power of the engine. The type of wings and propellers used are also factors of importance.

The height to which an average unsupercharged airplane can climb is rarely above 16,000 or 17,000 feet. The Barling Bomber, the world's largest airplane, which weighs 42,000 pounds when fully loaded, has with this ultimate load a ceiling not over 3,000 feet. For the *T-2*, the airplane in which Lieutenant Oakley G. Kelly and I made the transcontinental non-stop flight of 2,700 miles from New York to San Diego, the absolute ceiling with 11,000 pounds of load was the ground. In other words, with this load, under sea-level conditions, the total lift of the wings exactly balanced the force of gravity.*

We had 10,850 pounds of load for the final take-off, and with this weight the absolute ceiling was 2,700 feet. This fact made it necessary to pick our course, so that we would not have to cross mountains during the first stages of the flight. As the fuel was consumed, our load gradually lightened and our ceiling lifted, until when the Rockies were reached we easily scaled them.

When an airplane is at its ceiling, it is in a state of balance or equilibrium and swings or rolls with very little balance of the controls, which are powerless to force it higher.

* See "The Non-stop Flight Across America," by Lieutenant John A. Macready, U. S. Army Air Service, in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1924.



Official Photograph, U. S. Army Air Corps

AMONG THE CLOUDS ABOVE MC COOK FIELD

Before an attempt at an altitude record is made, all weather information possible is obtained. A clear day is highly desirable, otherwise a pilot may lose sight of his starting point and become lost. In order that a record shall stand, the pilot must return to the same field from which he started (see text, pages 769-770).

Such ceilings as I have cited, however, are extremely low compared to those dealt with in high-altitude flights, where the question of rare air adds its complications to the problem; for, as the altitude becomes greater, the air becomes less dense and its power of pressure within the engine falls off.

This statement becomes clearer if we realize that the air pressure, which at sea level, where we normally breathe, is 14.7 pounds per square inch, at 35,000 feet has diminished to 2.5 pounds per square inch, and that a Liberty engine which at sea level develops 400 horsepower, at 25,000 feet, because of this thinner air charge, can, with all its efforts, muster forth but 87 horsepower; and at 35,000 feet, of course, even less.

Obviously, the engine cannot force a heavy airplane higher on a starvation diet, and it was realized early in the altitude game that, to enable it to do so, some mechanical aid would have to be devised to keep it supplied with air of sea-level pressure—air that would feed to it its necessary quota of oxygen even when it traveled above the normal oxygen zone.

THE SUPERCHARGER MAKES HIGH ALTITUDES POSSIBLE

To fulfill this need a device was invented which compresses the rare air of the high altitudes to sea-level density and forces this compressed air into the carburetor, which in turn sends the proper combustive mixture to the engine cylinders.

This instrument, called a supercharger, will increase the ceiling of any plane upon which it is installed thousands of feet; more than that, with sea-level power in its engine, the climbing ability of an airplane is greatly increased, as this rare air offers much less resistance to the airplane surfaces than does the denser air of the lower altitudes.

The supercharger which I have used on my extreme altitude flights is a turbine wheel, which is revolved at great speed by the exhaust gases of the engine. Tests have shown that this turbine wheel, approximately one foot in diameter, makes about 40,000 revolutions per minute at 38,000 feet. It is difficult to conceive of such speed, equivalent, as it is, to 666 revolutions per second.

It is rather incongruous to think of generating heat from this thin, frigid air, sometimes colder than eighty degrees below zero, Fahrenheit. When compressed by the turbine supercharger, however, its temperature rises almost instantaneously, so that a radiator or inter-cooler had to be designed as part of the supercharger mechanism to cool the air before it reached the carburetor and cylinders.

PILOT'S DIVE THROUGH CLOUDS EXTINGUISHES FIRE

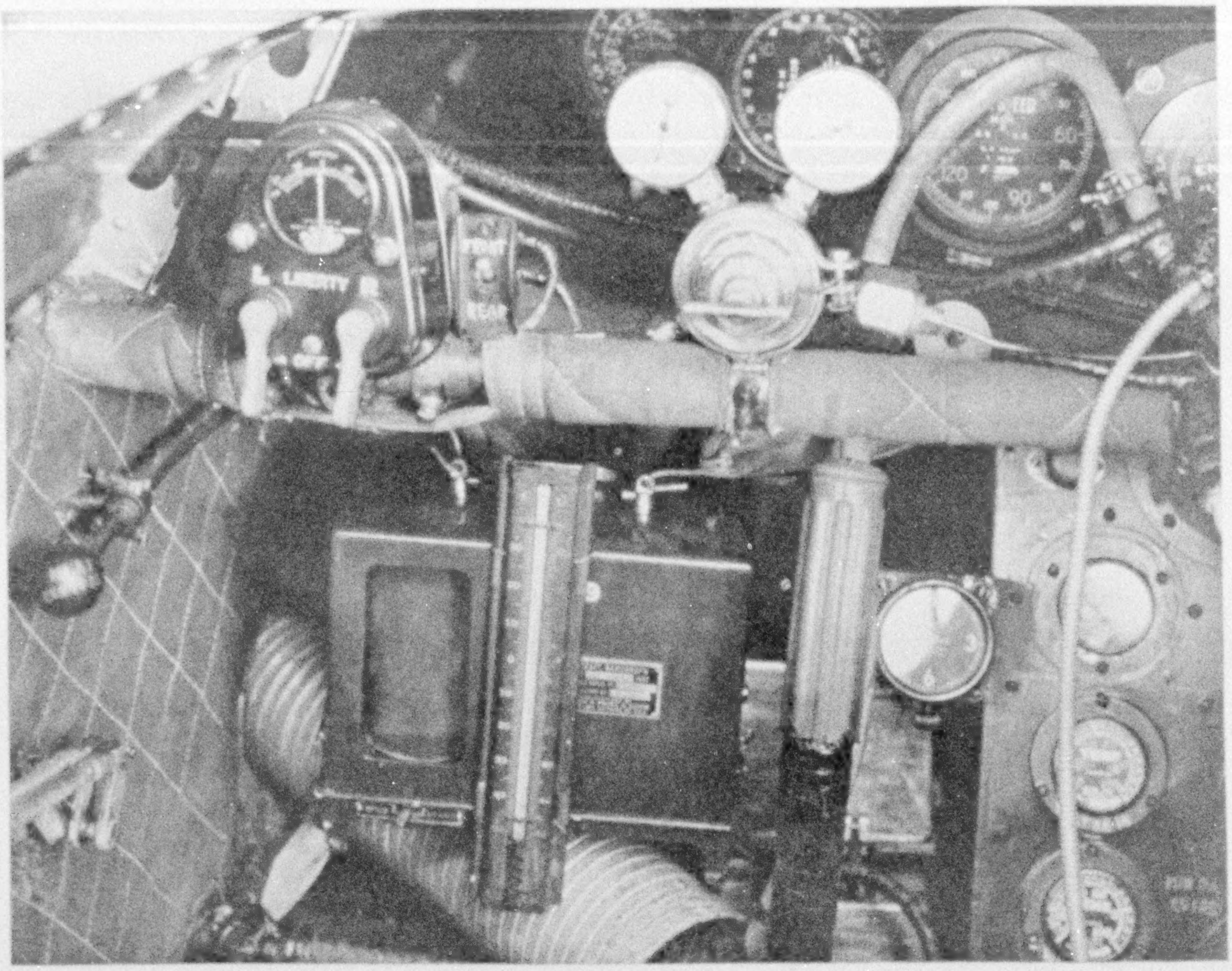
Before the perfection of the intercooler, this hot air caused preignition and malfunctioning of the engine, cutting short many a test flight. During the early experiments with superchargers, in fact, something was always sure to break in flight. Pipes and bearings have failed and parts of the supercharger have flown off in mid-air, making it necessary for the plane to descend in trouble.

One test I shall never forget. I had gone up against my better judgment, as the sky was completely overcast with clouds at 20,000 feet; but the test was an important one, the engineers being extremely anxious to acquire certain data before letting a large contract.

Roy Langham acted as my observer on the flight, and we obtained most of our information before reaching the clouds; then thrust up through them, as what we had acquired would be of no value unless the test were completed.

Above the clouds we flew a level or speed course at full throttle. Toward the completion of this course fire broke out in the engine, ignited the lubricating oil, and a dense cloud of smoke poured forth. I immediately plunged downward through the clouds, the dive putting out the fire, although the engine mount was still smoking.

I was lost. I could not see Dayton below or any recognizable landmark. Before we went up, Langham had been instructed to keep tab on our location, as I would be busy with the instruments. Now I turned about as well as I could in my bulky clothes and oxygen mask and tried to let him know, by pointing decisively toward the ground, that I had lost my bearings; then I turned to straighten up the ship.



Official Photograph, U. S. Army Air Corps

SOME OF THE INSTRUMENTS WHICH THE PILOT MUST WATCH

The illustration shows the front of the pilot's cockpit in the *XCO5-A,* ready for a high-altitude test.

When I turned again, Langham was over the side of the plane with his parachute, thinking I had motioned him to jump because of fire. I grabbed him and pulled him back just in time. Had he jumped it might have been a weird joke on Langham, as parachutes were far from their present highly developed stage at that time, and a safe landing was not nearly so assured to a flyer who trusted his life to one (see page 775).

On another occasion the propeller, whose revolutions per minute greatly increase in the lighter air, acquired such high speed at 28,000 feet that it flew off, knocking off the air-speed indicator and breaking the wing strut to which the indicator was attached.

COMBATING COLD 83 DEGREES BELOW ZERO

I hope such instances may prove my point, that it is the failure of his craft or its equipment, rather than his own failure to withstand the hardships of his journey, that sets the limit to the height that a pilot may fly. Nevertheless, physical hardships there are and of a type not to be belittled. Principally they consist of cold, lack of oxygen, and lack of sufficient air pressure—foes which are probably more treacherous to the body of the modern altitude airman than were Scylla and Charybdis to the ancient Greek adventurers.

Perhaps the least hazardous of these is the cold, although in the upward climbs temperatures as low as minus eighty-three degrees Fahrenheit are encountered. There is no way of shutting out such frigidity. It eats straight to the marrow. The principal defense against it is plenty of warm clothing (see page 754).

Under my uniform I usually wear two or three suits of woolen underwear and over it a heavy knitted garment of wool, with a thick, heavily padded, leather-covered

Official Photograph, U. S. Army Air Corps

LIEUTENANT MACREADY WITH THE RECORDING INSTRUMENTS USED DURING A HIGH-ALTITUDE FLIGHT

The records of an altitude flight are recorded on smoked paper by ten recording instruments located in the rear cockpit and sealed by official observers before the pilot takes off (see text, page 773).

suit of down and feathers over all. Fur-lined gloves, fleece-lined moccasins over my boots, and a leather head mask lined with fur, which with the oxygen mask entirely covers the face, complete the costume.

The goggles are coated on the inside with anti-freezing gelatine, supposed to prevent the formation of ice up to minus sixty degrees Fahrenheit. When ice forms on the inside of goggles, the pilot is completely devoid of vision.

Electrically heated suits have not proved practicable for such flights thus far, for they mean but another system of wires and switches for the aviator to add to his already complicated list of controls, and should anything go wrong with the wiring the suffering would be too intense for continuation of the flight, even if the extreme cold, with the other adverse conditions, did not cause unconsciousness.

THE ENGINE HEATS THE COCKPIT

As a further protection, the cockpit of the plane is lined with an air-tight insulation of felt, which eliminates the drafts, and part of the engine heat is conveyed into it through a tube covered with asbestos to prevent loss of heat by conduction to the outer air. The cockpit heater is effective until the descent is begun; then the engine gets very cold, as it is throttled for the downward glide to earth.

When I first took up high-altitude flying, however, the cockpit was not reinforced against the cold, and part of the pilot's body extended out in the blast of a 200-mile-per-hour wind.

As the blood circulation is low at high altitudes, my hands suffered most. I have many times had my fingers become so stiffened that they were totally useless, making it necessary to control the plane with the base of the hands or the wrists. In such cold it is easily within the bounds of possibility for a hand, foot, or even a leg to become frozen and the use of the member lost. Fortunately, the cockpit improvements came about before such a catastrophe happened to me.

Theory has always held that the temperature above a certain altitude is constant, both summer and winter; but flights

Official Photograph, U. S. Army Air Corps

MOUNTAINS EAST OF SALT LAKE CITY OVER WHICH THE AIR MAIL PASSES

during both seasons have disproved this. The temperature varies from ten to twenty degrees at different times of the year or during different days, weeks, or months.

TEMPERATURE OFTEN RISES WHEN PILOT GOES BEYOND 35,000 FEET

This year I made three flights during January and February, the months during which I have noted the lowest temperatures, to altitudes above 37,000 feet, encountering temperatures colder than eighty degrees below zero, Fahrenheit. However, on April 10 I found a temperature of eighty-two degrees below zero, Fahrenheit. But this was apparently an unusual condition and not characteristic of the season.

This year, for the first time, I have attained altitudes such that the temperature, having already reached its coldest point, had begun to rise. On January 29, at 37,000 feet, a temperature of eighty-one degrees below zero, Fahrenheit, was noted. At 38,704 feet this temperature had risen to seventy-six degrees below zero, Fahrenheit.

A month later, at 35,000 feet the temperature was seventy-seven degrees below zero, Fahrenheit, and at 36,000 feet it was sixty-eight degrees below, at which point it remained up to an indicated altitude of 39,000 feet (Fédération Aëronautique Internationale), which was the airplane's limit.

This region of warmer air at the higher altitudes is called the stratosphere of the earth. I have penetrated into the strato-

Official Photograph, U. S. Army Air Corps

TAKING ON A SUPPLY OF LIQUID OXYGEN (SEE TEXT, PAGE 765)

sphere only about 4,000 feet, but I would certainly not care to pose as "September morn" at the temperatures there, even though they are warmer than those found at lower altitudes.

An investigation of upper-air temperatures was conducted on Catalina Island, about thirty miles south of Los Angeles, during the year 1913. On August 3 two light, gas-filled, rubber balloons were connected and sent up, carrying a recording barograph. They ascended until the larger of them burst, because the air pressure without had become so much less than that within it, and the other, being unable to maintain alone the weight of the barograph, descended, bringing down its record of atmospheric conditions.

The temperature recorded was ninety degrees below zero at an elevation of eleven miles (58,000 feet). A temperature of 133 degrees below zero was obtained at the same altitude above Batavia, Java, near the Equator, November 5, 1913. Such data have been verified at various other places over the globe, but of course no man has ever penetrated such heights to date.

HOW THE LACK OF OXYGEN AFFECTS THE AIRMAN

Difficult as the cold is to combat, however, the lack of sufficient oxygen is even harder. One keeping close to the earth's surface, where he has the constant necessary supply without even having to ask for it, cannot realize its importance in every breath he draws, as does the altitude airman.

When a flyer reaches an altitude of 20,000 feet a peculiar depression takes possession of him. The sky looks gray and dreary, he feels a queer lassitude, and his faculties are greatly slowed up. He inserts the oxygen tube in his mask, and with a few deep breaths the whole world brightens. He is a different man, ready to think and act quickly.

Official Photograph, U. S. Army Air Corps

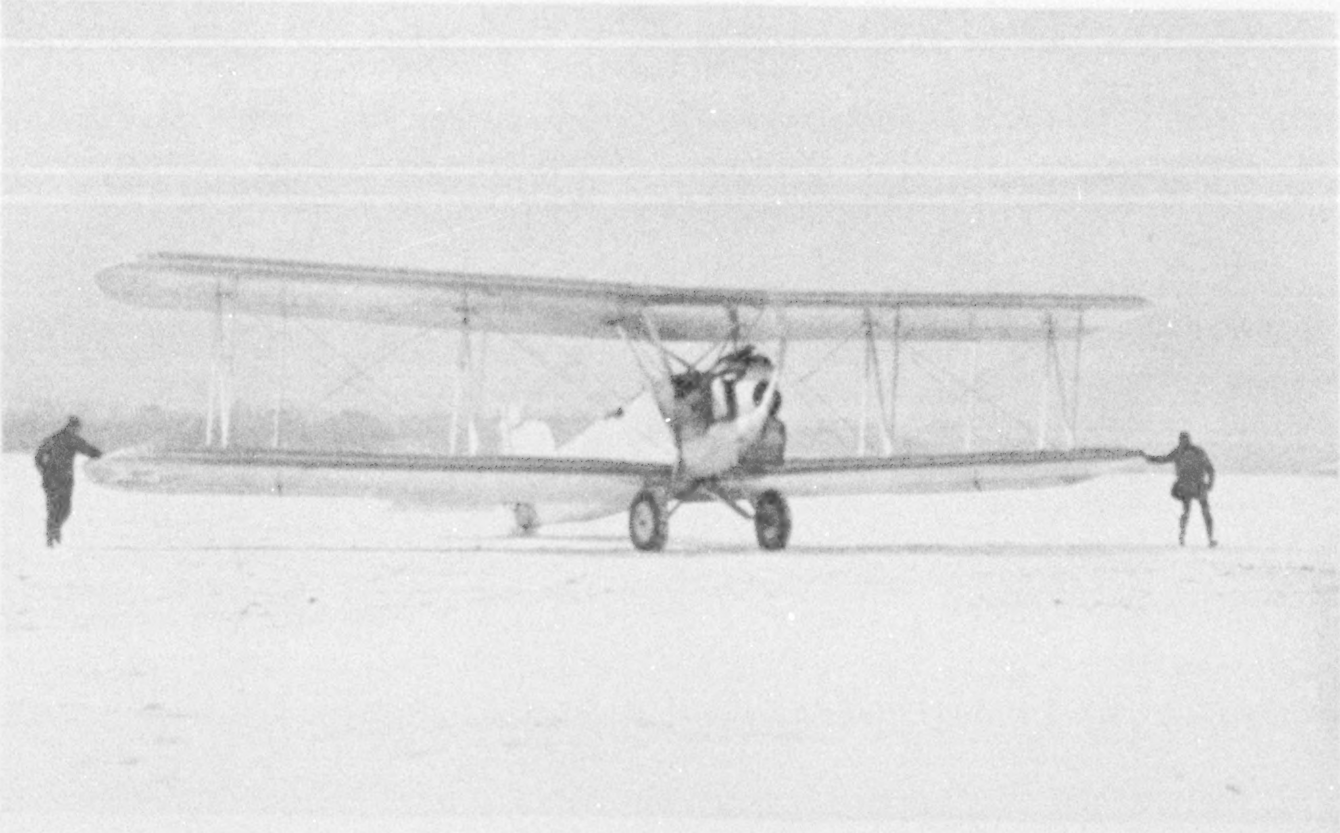
CLOUD FORMATION WEST OF MOUNT RAINIER

The tops of the lower layer of clouds are at about 10,000 feet elevation, and the aviators making this photograph were completely out of sight of the ground. The summit of Mount Rainier, to which they were heading, projected through the cloud layers like a great white dome, hard to distinguish from the white cloud banks around it. Before the plane could get close enough to Mount Rainier to photograph it, the high west wind drove the clouds up and over the summit, completely hiding it from view.

Up to 30,000 feet, as long as he gets plenty of oxygen, he feels no discomfort. Above 30,000 feet, any exertion makes him realize that he needs more and more of it. If he stoops to make an adjustment, the instruments in the cockpit become dim and shaky. It is difficult for him to focus his mind upon what he is trying to do.

The great danger lies in the fact that in this light air pressure he cannot assimilate all the oxygen he needs. It is impossible for the lungs, with their capacity of taking in the necessary amount of air at ground levels, to take in five times the volume, as they would have to do at 35,000 feet to get an equal amount of oxygen, if the flyer were not supplied with the artificial variety.

To do this the lungs would have to expand to five times their natural size. Even when breathing almost pure oxygen in this light medium, they do not seem to receive a sufficient amount and it makes flying at such heights exhausting in the extreme.



Official Photograph, U. S. Army Air Corps

THE ALTITUDE SHIP "XCO5-A" AFTER LANDING FROM A RECORD ATTEMPT

Most pilots begin taking oxygen at 16,000 or 17,000 feet, using more and more of it as they ascend. Formerly this artificial oxygen was used in the gaseous form; more recently liquid oxygen has replaced the gaseous almost entirely, except in emergency (see page 763).

GASEOUS OXYGEN IS CARRIED IN STEEL FLASKS

The present gaseous oxygen, however, is a greatly improved product over what it used to be. It is no longer apt to contain impurities and moisture, which were wont to freeze in the tubes, shutting off the supply; nor does it sicken the flyer by having a slight but perceptible taste. In the plane, it is carried in steel flasks weighing about twenty-five pounds (see page 769).

Considering this weight, I broke an extremely important record during one of my early flights, according to a Cincinnati newspaper. When a pilot opens up an oxygen valve, in flyer's lingo, he "cracks an oxygen flask." On this flight the airplane was equipped with two separate systems of gaseous oxygen, the main system and an emergency system. Just before the airplane reached its ceiling, trouble occurred, the main system becoming clogged with ice. I "cracked the emergency flask."

Upon reaching the ground I happened to mention this to a newspaper correspondent, and was somewhat dazed the next morning to see in black and white that at 39,000 feet—altitude was measured in a different manner at that time—Macready had felt the need of oxygen; so, reaching for his emergency flask, he had cracked it over his head, getting relief. According to this statement, I felt I could lay undisputed claim to the solid ivory championship, as the hardest-headed man in the world.

LIQUID OXYGEN IS "DRY"

The great advantage of liquid oxygen over gaseous oxygen is, paradoxically, its absolute "dryness," having no moisture to freeze in the tubes, and the fact that the pilot begins taking it at the ground in a barely noticeable flow, receiving it automatically in gradually increasing amounts, as he ascends, whereas in the gaseous form he begins taking it when he feels that he needs it.

The liquid oxygen is poured into a container on the ground. Constantly boiling, it evaporates into a gas, which is breathed into the flyer's lungs through his mask. As the atmospheric pressure decreases with altitude, the liquid boils more rapidly,

Official Photograph, U. S. Army Air Corps

WATCHING AN ASCENT FOR A WORLD'S RECORD ALTITUDE FLIGHT

Orville Wright (left), who, with his brother, Wilbur Wright, invented the airplane, and George B. Smith, official observers at McCook Field, Dayton, Ohio, where the author has made 50 flights to altitudes above 30,000 feet. The conditions under which altitude records are recognized are explained on pages 771 and 773.

so that increasing amounts are made available. At great heights the oxygen comes through the tubes with such force that it blows the flyer's lips apart.

THE TREACHERY OF THE UPPER AIR

Reliable as this system is, however, it has its loopholes for error which might easily cost a life. On one of my more recent flights the amount required was miscalculated by the engineer in charge, and at 35,000 feet I began to feel dull and irritated. Objects on the ground, as well as the instruments before me, became blurred and unsteady. Suddenly it struck me that I was losing consciousness. Major Schroeder's experience flashed across my mind.

I placed my tongue to the end of the tube supplying oxygen to the mask and found scarcely any pressure at all. Immediately I put the emergency tube into service, breathing deeply of the life-giving gas, and the whole world brightened.

It may seem strange that I did not know sooner that the supply was running low, but I had no idea that the container did not hold its usual ample amount, and so gentle is this "passing out" process at high altitudes that it is apt to take the flyer absolutely unawares, if he is not on his guard against it.

Therein lies one of the upper air's subtlest treacheries, emphasizing how much the airman's life is dependent upon the small, flimsy tube which connects him with his oxygen system, without which he could not remain conscious above 30,000 feet for even a short time.

While equipment for alleviating the intense cold and for supplying oxygen has been well perfected in recent years, nothing has ever been found which will do for the human mechanism what the supercharger does for the engine mechanism in the areas of decreased air pressure above 30,000 feet.

For the human body, fashioned to thrive in an air pressure of 14.7 pounds per square inch and having through the

Official Photograph, U. S. Army Air Corps

OFF TO TOUCH THE "CEILING"

Pulling the blocks from in front of the wheels of the altitude ship *XCO5-A* to permit a take-off for a record attempt.

long ages built up an equal air pressure within its walls, feels in every nerve and artery the inequality when that pressure outside has diminished to 2.5 pounds per square inch.

In the airplane engine, as I have noted elsewhere, this difference causes a drop from 400 to 87 horsepower. The light rubber balloons sent up to obtain wind directions or temperatures at high altitudes rise until this outer pressure becomes too negligible for the force of the inner pressure, when they burst.

AIRMAN FAILED TO "EXPLODE FOR SCIENCE"

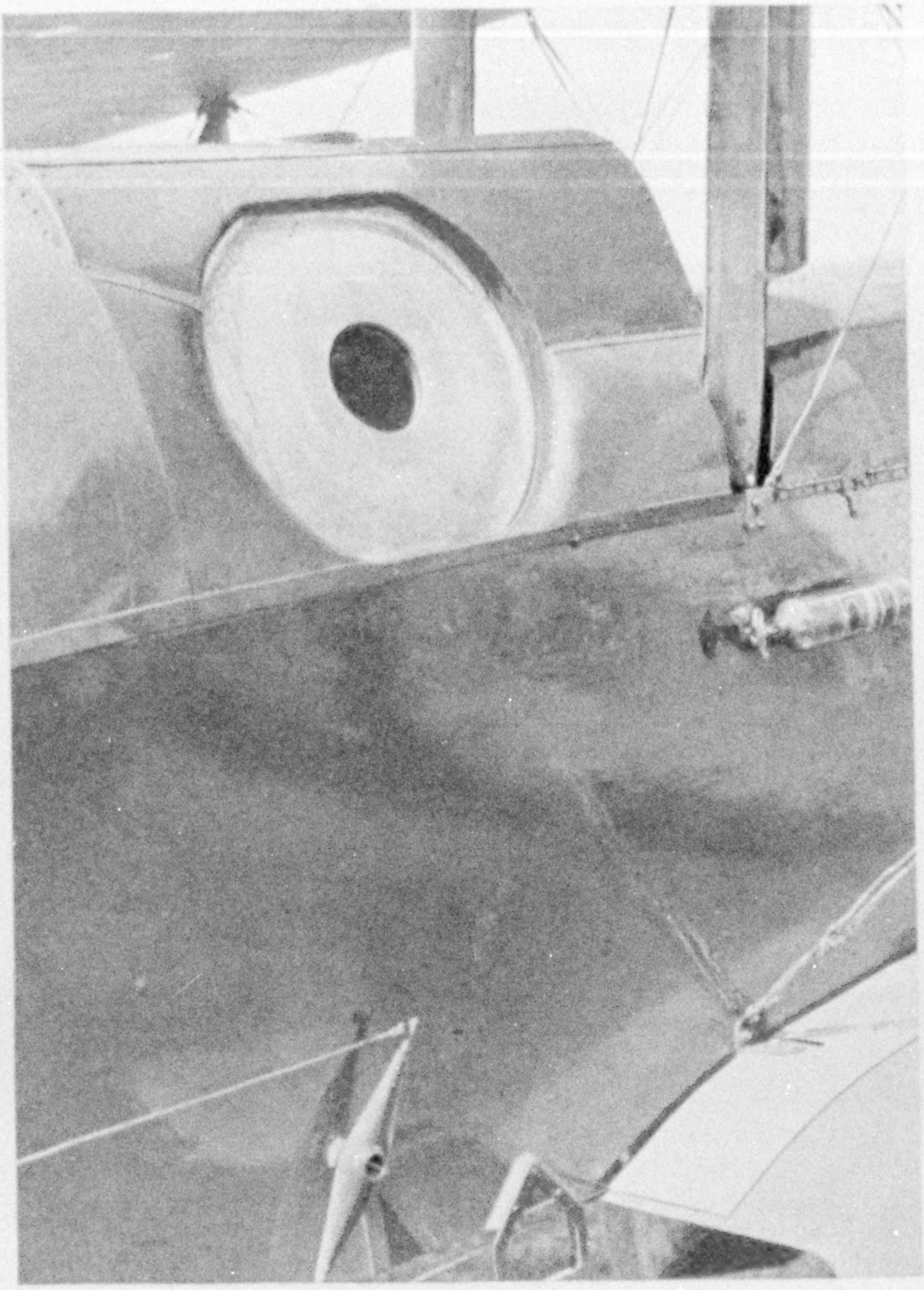
This latter fact was responsible for another strange misconception which was detailed to the public through the pages of the press. Awakening one bright Sunday morning, I found staring at me from the front-page headlines, in bold type, the announcement, "Macready to Explode for the Benefit of Science."

I confess I was rather frightened, for life was sweet at the moment and I had no desire to have it terminate, especially in such an undignified manner. I read the article. It was written by a correspondent I had never seen and who had attributed to me statements I had never even imagined in my wildest dreams.

The writer knew that I was about to make an altitude test, taking a plane up as far as possible. Having heard of the fate of the small rubber balloons, which also went up as far as possible, he drew the conclusion that the low air density would have the same effect upon the human body.

The article, which was broadcast generally throughout the land, inspired a minister in Cleveland to preach a sermon upon the asininity of Macready, caused considerable editorial comment along similar lines, and was the occasion of many telegrams and letters, some of them earnest, some uncomfortably humorous. It was a bit chastening, of course, to have been considered quite as empty as a rubber balloon, and although at the time I may have felt an explosion imminent, it was one of an entirely different variety.

So far, the difference in air pressure,



Official Photograph, U. S. Army Air Corps

THE DOOR OF THE PRESSURE CABIN THAT VERY NEARLY BECAME A COFFIN (SEE TEXT BELOW)

The pilot crawled through this small steel door, which was locked and forced outward by the inside pressure. The small hole was closed with plate glass, and the pilot was supposed to peer through this for visibility in flying and landing. After the single experience described by the author, the device became a "museum" curiosity.

although a hardship during the flight, seems to have no permanent injurious effect upon the flyer. How much higher he will be able to force his way in spite of it is a problem. Unless some artificial aid is devised, it will probably form the barrier which will eventually limit his progress through the stratosphere. The Army Air Corps has been keenly interested in overcoming this greatest of all handicaps, but to date none of its experiments has proved practical.

Several years ago one of these experiments took the form of a pressure cabin which was built upon a plane. It was a round affair, about as big as a good-sized barrel, constructed of steel, and practically air-tight when the door was closed. A hole, six inches in diameter, was cut in the top of the cabin and one of the same size in the left side. Both were closed with heavy plate glass, through which the vision was not particularly clear.

The cabin was entered on the right side, through a round, solid steel door, twenty-two inches in diameter, which closed and locked from the inside. It was almost necessary to use a shoehorn to get through this opening, and I felt, as I locked myself in for the first test, as if I were going over Niagara Falls in a barrel.

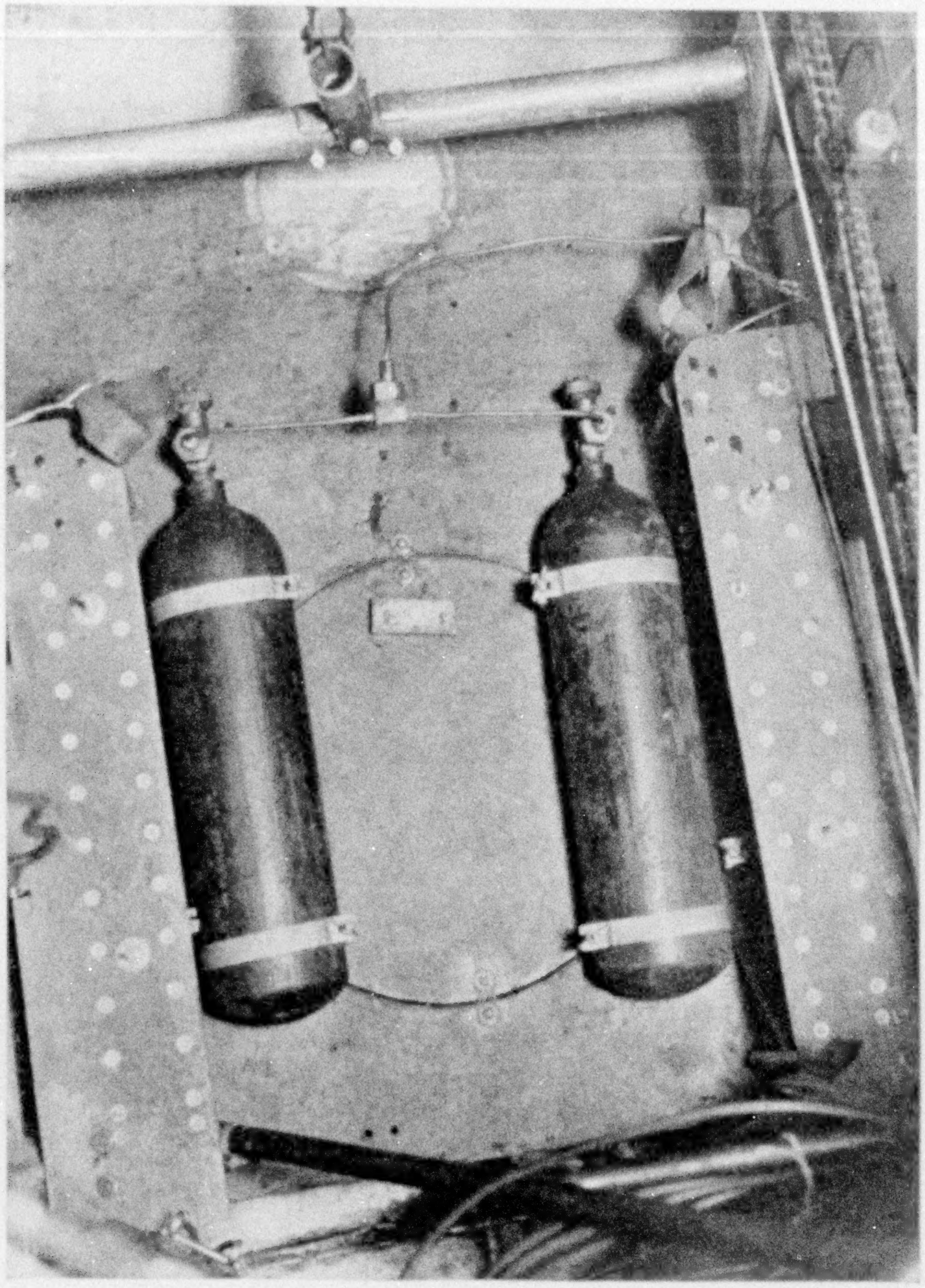
Pressure was built up within the cabin by means of a small, wind-driven compressor. A valve operated by the pilot for relieving the pressure was at the top of the cabin.

After the airplane had climbed a few hundred feet, the pressure within the cabin began to build up faster than the relief valve could let it escape. I tried to get the door open to permit an equalization of pressure with the outside air, but found this inside pressure so great that it was impossible for me to move the door inward, much less open it.

As the pressure was rapidly increasing, I faced the predicament of finding myself trapped. I throttled the engine and glided

back to McCook Field as slowly as possible, in order that the small propeller operating the wind-driven pump would decrease its revolutions and thus cut down the amount of air being forced into the cabin.

The landing was a poor one, because of the slow speed at which the plane was glided and the almost complete absence of visibility, but the airplane was not injured and now reposes in the McCook Field Museum. The general consensus of opinion, however, following this flight was that the lack of sufficient air pressure was of less danger to the pilot than being cooped up in this metal coffin.



Official Photograph, U. S. Army Air Corps

EMERGENCY OXYGEN FLASKS IN THE REAR COCKPIT

These containers are made of steel, weigh twenty-five pounds, and are used if the mechanism controlling the flow of the liquid oxygen does not function properly (see text, page 765).

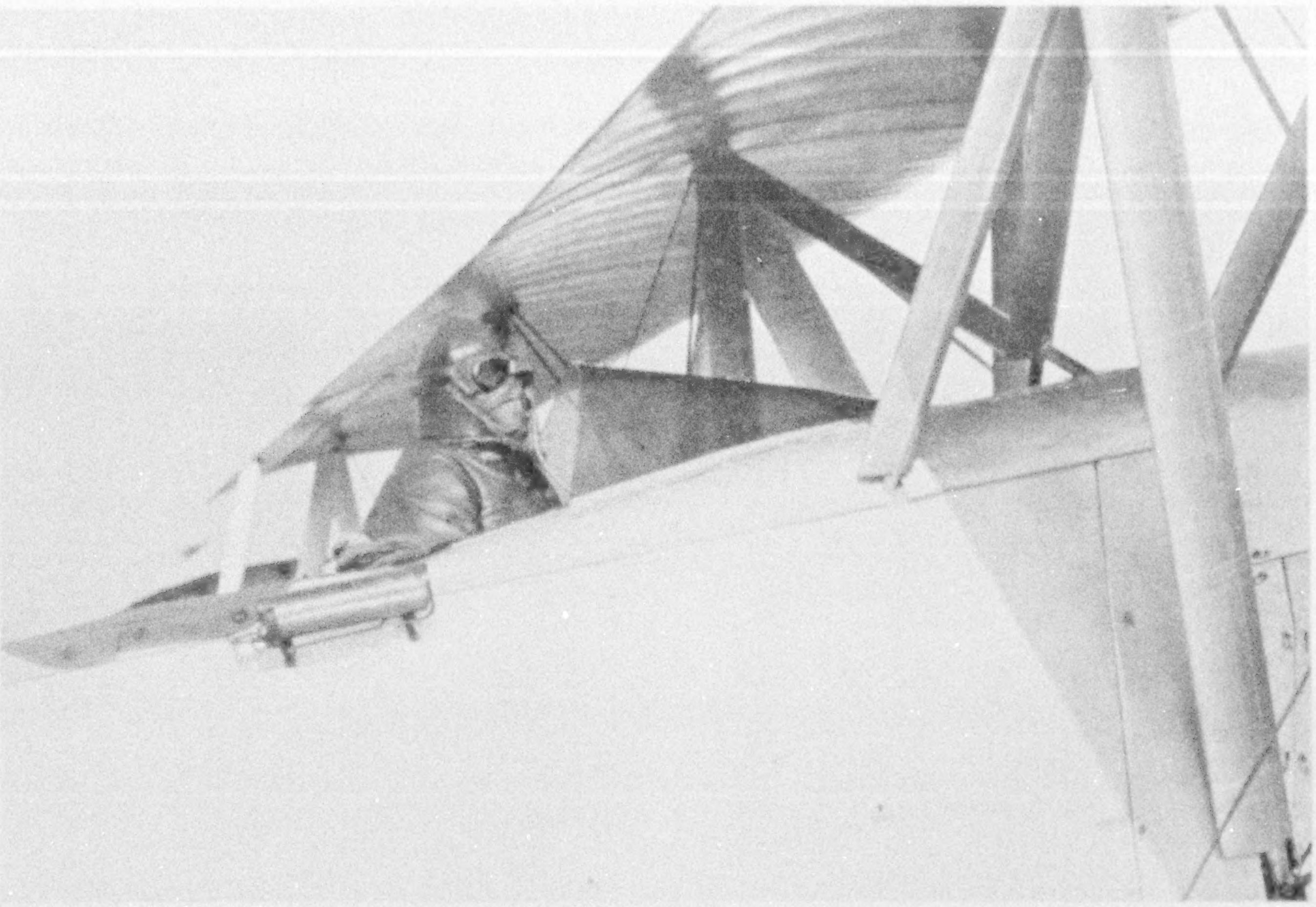
TRAINS LIKE A PRIZE FIGHTER FOR ALTITUDE FLIGHT

Without the successful mechanical aids previously described, such altitudes as have been gained would have been impossible; but another essential prerequisite to a successful high flight is the flyer's first-class physical condition. In preparation for height tests, I usually follow the same system of training that I followed several years ago at Leland Stanford University when I was preparing for what subsequently proved to be the amateur lightweight ring championship of the Pacific Coast.

This consisted, in general, of a run in the morning before breakfast, plenty of other exercise, and extreme care regarding diet and sleep. Early morning running, which in winter must be done in partial darkness, has often been accompanied by the barking of dogs, and once resulted in my being stopped by the neighborhood watchman as a suspicious character.

With plane, equipment, and pilot in readiness, the weather also forms a consideration of primary importance. The sky must be clear. On a cloudy day, with the ground out of sight, the pilot might easily drift for several hundred miles from his starting point and find himself without sufficient fuel to find a safe landing spot.

Moreover, should he have topped the world's altitude record, he must, to have official recognition, land on the same field from which he started, in full sight of



Official Photograph, U. S. Army Air Corps

IN THE COCKPIT OF THE "XCO5-A," READY TO TAKE-OFF

Note the heavy clothing, oxygen tube, and mask worn by Lieutenant Macready, and the fire extinguisher on the side of the plane.

the official observers of the Fédération Aëronautique Internationale, which is the international governing body on aviation contests.

WHY ALTITUDE FLIGHTS ARE MADE CHIEFLY IN WINTER

Because there is less violent contrast between the temperatures at high altitudes and those at the ground in winter than in summer, most altitude flights are made at that season of the year, although the sky in the vicinity of Dayton is cloudy the greater portion of the time. For example, there was but one clear day in Dayton during the entire month of February, 1926.

All weather information possible is usually obtained from the local forecaster on the day before the flight is planned. However, even with a clear day forecast and having become an actuality on the given morning, within a few hours the sky may darken.

In fact, having used all precautions and started up with the sky clear, I have had the clouds drift in under me and, although attempting to keep my location, have found myself completely lost, coming down through them forty or fifty miles from Dayton. I have always been fortunate enough in such instances, however, to locate myself and get back to McCook Field without landing elsewhere.

HOW A TEST FLIGHT IS STAGED

One morning after waiting, perhaps for weeks, a day dawns crisp, cold, sunny, and cloudless and remains so. One of the first things to be done is to telephone Mr. Orville Wright, who, with his brother, Wilbur, invented the airplane and who serves as the representative of the Fédération Aëronautique Internationale in the United States.

He and several other prominent business men of Dayton, who give freely of their time to this work, act as the official observers of the flight (see page 766).

Because the vitality is at its best in the morning, these flights are always made in the forenoon, as early as possible.

At the field the plane is being tuned up and made ready to go. The liquid oxygen

Official Photograph, U. S. Army Air Corps

BOSTON FROM AN ELEVATION OF 18,000 FEET

The area shown in the photograph is more than ten square miles.

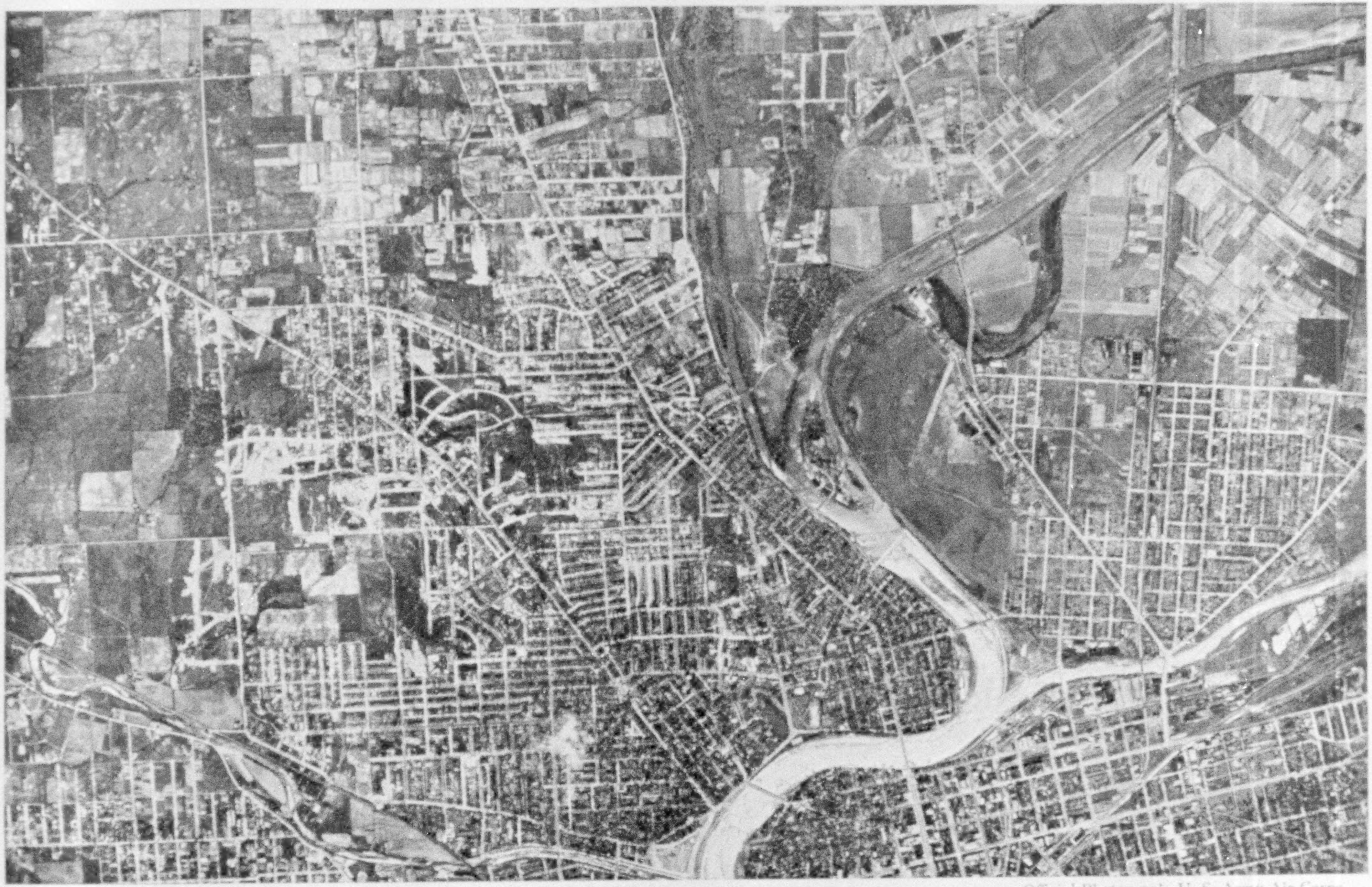
is poured into the container, the instruments are carefully inspected and sealed by the official observers, according to the international ruling.

Considerable time is required to get into heavy clothing and don all the paraphernalia of high-altitude equipment. Newspaper men, photographers, and moving-picture operators are on the scene, and they take more time. But at last all is in readiness, and, with the call of good wishes in my ears, I climb into the plane and taxi down the field for the take-off.

THE SENSATIONS OF HIGH FLYING

On any climb one must keep his eyes fastened on a city or distinct object, as he ascends. I usually start mounting in circles around Dayton until I reach about 20,000 feet; then turn due west, the speed of the plane making small progress against the heavy prevailing head winds. This wind, in fact, has been so strong that, even when heading directly into it, I have been blown backward for some forty miles.

I see Dayton grow smaller and smaller. If I take my eyes from it to observe the instruments or to make some adjustment, I may not find it again or I may get it confused with some similar place on the broadened horizon, if the plane has shifted its direction while I have been occupied. On one flight this happened and I picked up a small smudge which I thought to be Dayton, but afterward



Official Photograph, U. S. Army Air Corps

THE HIGHEST ALTITUDE PHOTOGRAPH EVER MADE

Lieutenant John A. Macready and Captain A. W. Stevens, in May, 1924, made this photograph of Dayton, Ohio, from an elevation of 32,220 feet—more than six miles above the city and 3,000 feet higher than the summit of Mount Everest (see text, page 774). The top of the picture is toward the north. The large open space in the bend of the river and a little to the right of the center of the picture is McCook Field, where the Army Air Corps conducts its experimental work.

found to be Springfield, about thirty miles away.

As the plane continues its climb, the flyer becomes aware of the changed atmospheric conditions through all his mind and body and begins to guard against their effect upon him. How far can he go without collapse? There has never been any special fear in this problem for me, for I have always felt that the final moment of extreme danger could be realized in time.

If it were not and the pilot became unconscious, I believe the determination, concentration, and worry undergone in attempting to keep from loss of consciousness would bring him to normal again when lower altitudes were reached, in the same manner that one automatically awakens from sleep at a certain time if determined to do so beforehand.

FEAR PLAYS NO PART IN AIRMAN'S EMOTIONS

Nor is there any fear of the height. Height is part of an aviator's life, just as driving an automobile is part of the average man's. It is only when some calamity brings possibilities home to the driver that he thinks of his car in connection with danger. This also holds true for the airplane.

In practically all extreme altitude attempts, the plane reaches its limit about the time the pilot grits his teeth in anticipation of pushing farther upward. One isn't thinking as clearly as usual at this height, and it takes some time to convince oneself that the plane's ceiling has actually been reached. I usually remain at this altitude for some half hour, endeavoring to make adjustments or change the functioning of the supercharger, coaxing the plane higher.

The control wires contract in the extreme cold and are very tight, and the lubricating oil on the pulleys over which the control wires operate freezes. As a result, the controls are difficult to move.

The plane wallows about as in a trough, but will not lift its nose an additional foot.

Hoping that I have bettered its previous records, I turn its nose downward for the descent, a much quicker operation than the climb, and when I reach the ground the crowd comes hurrying forth, anxious to learn the results, which have been recorded by the instruments.

Twenty-two instruments were in the pilot's cockpit of the Le Pere 53, the airplane in which I broke the world's altitude record. But the history of the flight itself is recorded on smoked paper—ink would freeze—by ten recording instruments located in the rear cockpit (p. 761).

These graphs tell the full story of what has happened at each stage of the climb, and they can be coördinated as to time. The different temperatures and pressures which have prevailed within the engine are set down, as are the revolutions of the engine, atmospheric pressures and temperatures, and altitudes.

Two recording barographs are usually carried in the plane, so that if something happens to one, the other may bring down in dependable form whatever achievement has been made. Nothing is left to the imagination of the pilot. No altitude record to-day would be officially recognized without automatically written accounts. Upon the completion of the flight, these records are also carefully studied by the engineers and steps taken to remedy any defects indicated in the plane, engine, or equipment.

Even after a written barograph record is obtained, however, scientists do not agree as to the correct method of computing from it, in feet and inches, the height which has been attained. The reader has undoubtedly been thinking of the distance as it would be measured by a plumb line from the plane to the ground. Such a method would be a great boon to pilots, engineers, and scientists; but, with a plane climbing in circles, drifting away from its base for miles and out of sight of the ground, it obviously cannot be done in this way.

DISCOURAGING DISCREPANCIES IN MEASURING ALTITUDES

It is only when heights are fixed, as with mountains, and can be seen as angles and distances on the ground, that the obtaining of actual measurements becomes a simple matter.

Actual heights from the air can at present be measured only through photographs of points on the ground the distances between which are definitely

known. Captain A. W. Stevens and I took a photograph of the city of Dayton from the greatest height from which a photograph has ever been taken—32,000 feet—by this concrete method of reckoning. According to the measurements of the Fédération Aéronautique Internationale, which prescribes the manner of calculating all aviation records, the altitude obtained that day was 31,000 feet, while the altimeter indicated 35,000 feet.

The Fédération has established a table of arbitrary temperature corrections based on the theory that the temperature at extremely high altitudes is constant. Actual experience, however, has shown this not to be true; hence the computation is seldom in accord with what would be the correct computation from an engineering standpoint.

Cold air is heavier and more dense than warm air; a lower column of cold air will give the same pressure as a higher column of warmer, lighter, less dense air. Therefore altitude should be based on density, which in turn should be based on the temperature actually encountered in flight.

In the Dayton photograph the difference between the actual altitude reached and the altitude as computed by the Fédération method of reckoning, because of atmospheric conditions, was not great. Frequently it amounts to 6,000 or 7,000 feet. For instance, my highest official altitude record of 38,704 feet, if measured by a surveyor's chain would be approximately 44,000 feet.

It is very discouraging to a pilot, when his cockpit instruments have given every indication of the plane being considerably above the height of the world's record, to have the barograph calibration bring the altitude down to a few hundred feet below it; and this has happened to me several times.

NO WAY TO COMPARE INTERNATIONAL ALTITUDE RECORDS

Under the present system, there are no adequate means of comparing international altitude records. The instruments used by one nation may be different from those used by another nation, and the readings and calibrations may vary. To obtain an exact comparison of international altitude flights, the same type of instruments should be used.

The *XCO5-A*, the plane used during my flights of 1926, which reached an official altitude of 38,704 feet, was a two-place military airplane and was built as a flying laboratory to obtain knowledge for practical use in high-altitude photography. It made possible photographs of the ground from above 30,000 feet, which would be of great military value. A vertical picture from this altitude might provide an accurate map of sufficient size to include both lines of attack. Distances and angles of fire could readily be obtained and the airplane would be out of sight of the ground.

SCHEME TO FLY OVER EVEREST

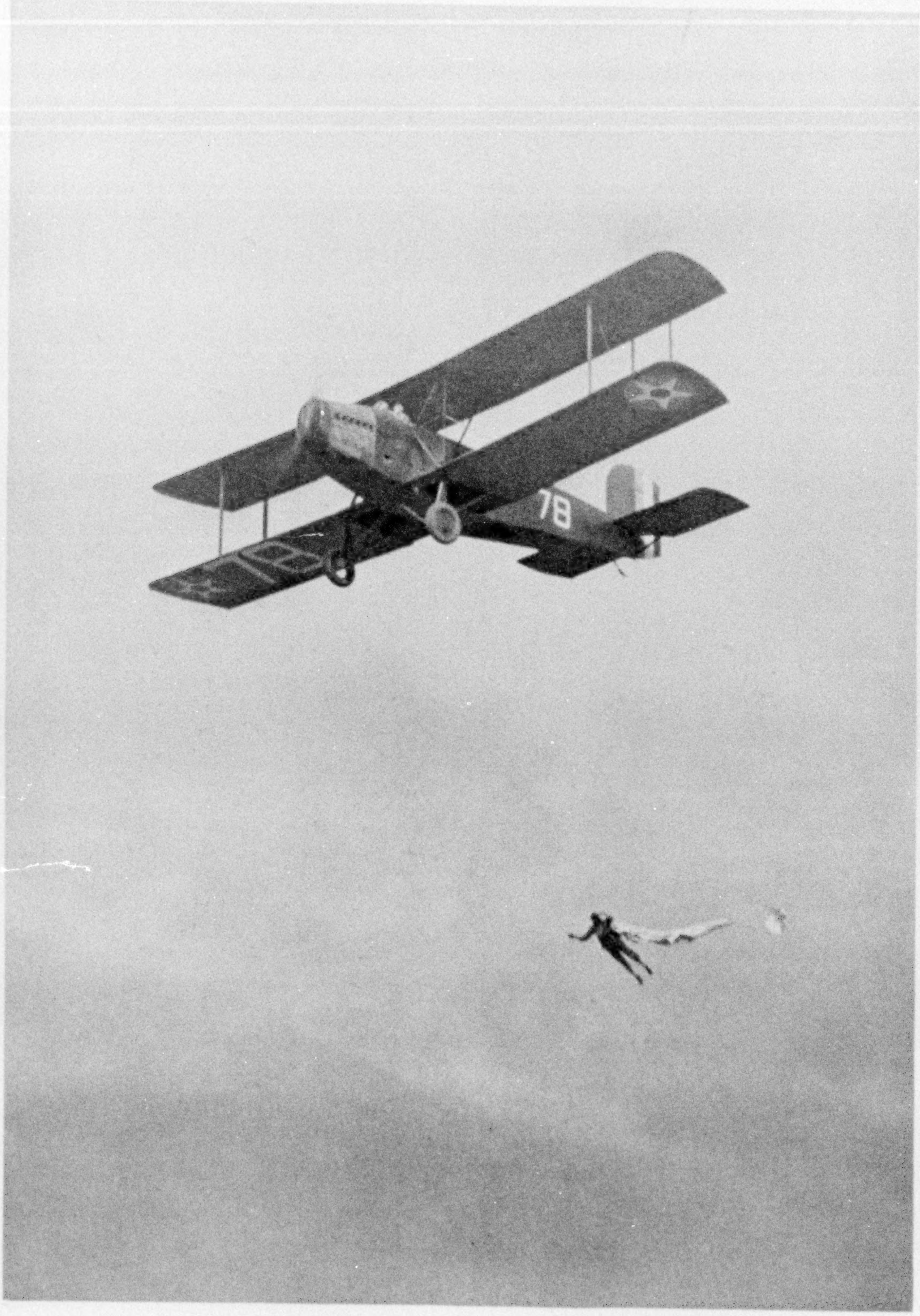
Inaccessible and hitherto-unexplored heights could also be photographed and mapped from it. Captain Stevens and I were most anxious to undertake this kind of work and wrote the Chief of Air Service for permission to do so. Mount McKinley and the high fastnesses of Alaska could be photographed and mapped; pictures of great scenic areas, such as a grouping of New York, Long Island, and New York Harbor, might be obtained at one exposure.

Most of all, we were desirous of attempting a flight over Mount Everest, which stands as a perpetual challenge to man's daring, its peak, 29,141 feet in height, having never been scaled.

Year after year expeditions have been formed to renew the attack on this summit. All have been failures and have cost a total of fifty-one lives and a great sum of money. In 1925 Mallory and Irving, admirably fitted for the task, both physically and through experience, died in the attempt to reach the peak, after climbing higher than any of their predecessors.

The difficulties in getting over the top of this mountain by air would be as small in comparison to those encountered on foot as were Commander Byrd's in flying over the Pole compared to those of his trudging antecedents, and much more could be obtained for the world's geographical knowledge in air pictures and maps from one flight than in many foot expeditions.

When it is remembered that the ceiling



Official Photograph, U. S. Army Air Corps

A PARACHUTE PLUNGE

The "chute" is made of a very light, strong grade of silk and requires only about three seconds in which to open after the jump is made and the rip cord or releasing device is pulled. The small umbrella trailing out to the right is called a pilot chute. It is opened by "safety-pin" springs and serves to pull the main parachute out of its pack and into position. Although a parachute ordinarily will open within 200 feet of fall, nothing less than 500 feet is considered a safe jumping distance.

of the *XCO5-A*, according to the conservative Fédération methods of reckoning, proved to be 38,704 feet, there is no reason why it could not easily scale Mount Everest's peak with thousands of feet to spare.

STALLED ENGINE COULD GLIDE 75 MILES

The gliding ratio of this plane, which is 13½ to 1, would also be favorable. This means that if the airplane were one mile high and the engine suddenly stopped functioning, it could glide with a dead engine, theoretically, a distance of 13½ miles. Actually, the distance would be a little less because of the light air. From an altitude of six miles, the airplane could be glided about 75 miles; so that it does not seem too much to believe that if the engine stopped above the summit of Mount Everest, the pilot could glide to a place of safety.

On my last attempt for the world's record, April 10, 1926, the gasoline supply of the *XCO5-A* became exhausted when I was hanging at the ceiling at an official altitude of between 37,000 and 38,000 feet. I had been blown back by the wind while climbing, so that when the engine stopped I was still drifting backward, and was between Springfield and Columbus, Ohio, about 45 miles from the starting point at Dayton.

Because of the heavy wind, I dived the plane downward in order to gain headway by excess speed, pointing its nose toward Dayton, but scarcely hoping to reach my starting point.

As I came lower the wind direction changed, and when I reached Dayton I was a mile above the city, much to my pleasure, and was able to land at the home field.

This illustrates the fact that even though motor trouble were to develop when well above Mount Everest, the plane could be glided over and down the steep slopes at least to a point where one could live without artificial oxygen, and later continue the descent in safety.

In the Principality of Nepal, which lies at the southern base of the peak, there are places to land, where the elevation is about 7,000 feet, within sight of Mount Everest and 70 or 80 miles from the summit.

The question I am most frequently asked after an altitude flight is, "What did it look like up there, Mac?" Always after I have reached the plane's ceiling I look straight downward over the side and get a great "kick" out of the view almost eight miles vertically beneath me.

During January and February of this year it was my good fortune to take off on days which were very cold and clear, immediately after a heavy snowstorm, which had washed the atmosphere clean. The ground temperature was zero, Fahrenheit, too cold to be enjoyed by the shivering observers. The earth was pure white, but was dotted and speckled with black. Each of these little dots or smudges, which indicated the position of a city, was trailed by a streamer of black smoke.

From my position over Dayton, Ohio, I located the smudges of Indianapolis, Cincinnati, Columbus, and Toledo. The size of the city was indicated by the varying lengths of smoke trails. There have been times when the air has been full of dirt and mist, when it has been almost impossible to see the ground; but I could usually find a minute thread of river, usually the Miami or Ohio, breaking through to help me check my position.

LONELY WORK AT THE EARTH'S CEILING

In the spring, summer, and fall of the year, when the trees are in leaf, the colorings of the cities and fields blur and blend until, at a distance, even the smoke trails become indistinguishable. But always this view is a magnificent thing, and one can easily imagine himself a superior being looking upon the work of Lilliputians, so infinitely small does the product of man's labor seem.

But the pilot does not dare let his slow-thinking mind turn to philosophical reveries. Instead, he must face the frigid, biting wind, with its attendant discomforts of smoke-begrimed goggles, oxygen mask, and other unnatural appendages, and see to taking his plane safely back to earth. He is quite willing to figure once more in the actions, hopes, and dreams of his fellow Lilliputians.

It is lonely work fighting the elements at the Earth's ceiling, but I hope that my six years spent in high altitude experimental work have produced something of value to our Government.

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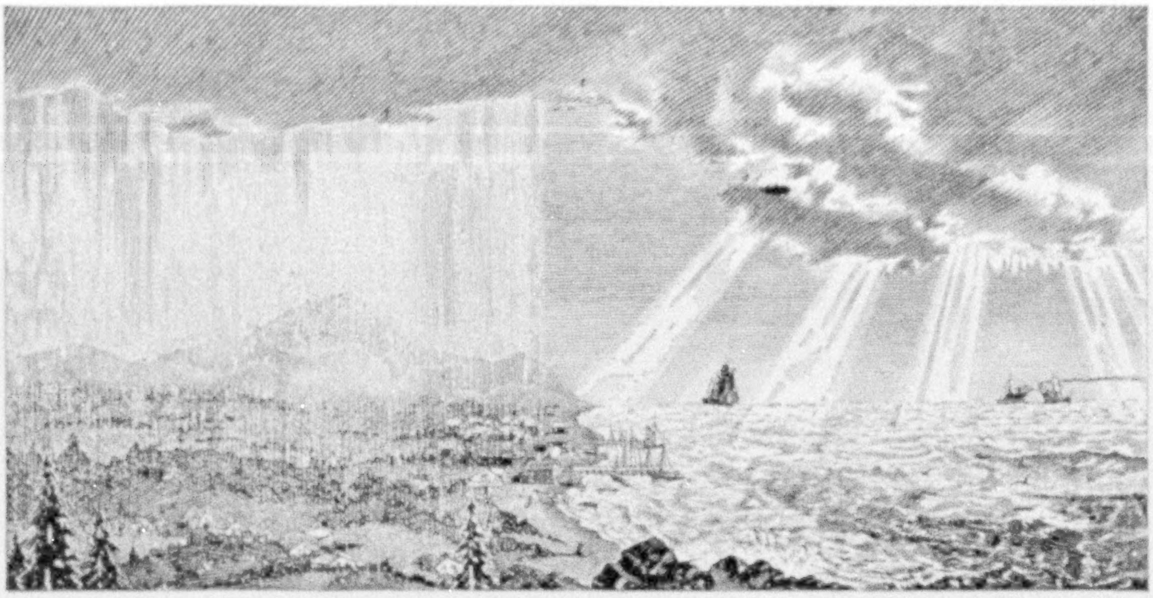
WITH THE MEAL OR AS A MEAL SOUP BELONGS IN THE DAILY DIET



Rain and Telephone Calls

THE annual rain fall in the United States would weigh over three and one-half trillions of tons.

This vast weight is drawn up to the clouds by the unseen but effective power of the sun; representing energy equivalent to 300 billion horse-power.

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There must be the man-power of 300,000 individuals to build, maintain and operate the telephone system.

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The rain sustains life; the telephone furnishes swift communication for the nation, and they are alike in requiring a vast amount of unseen energy.

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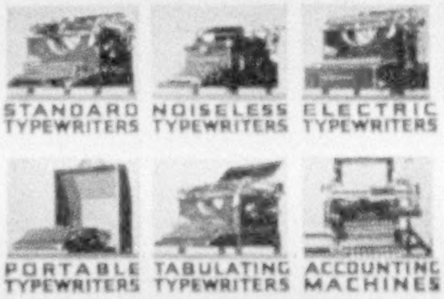

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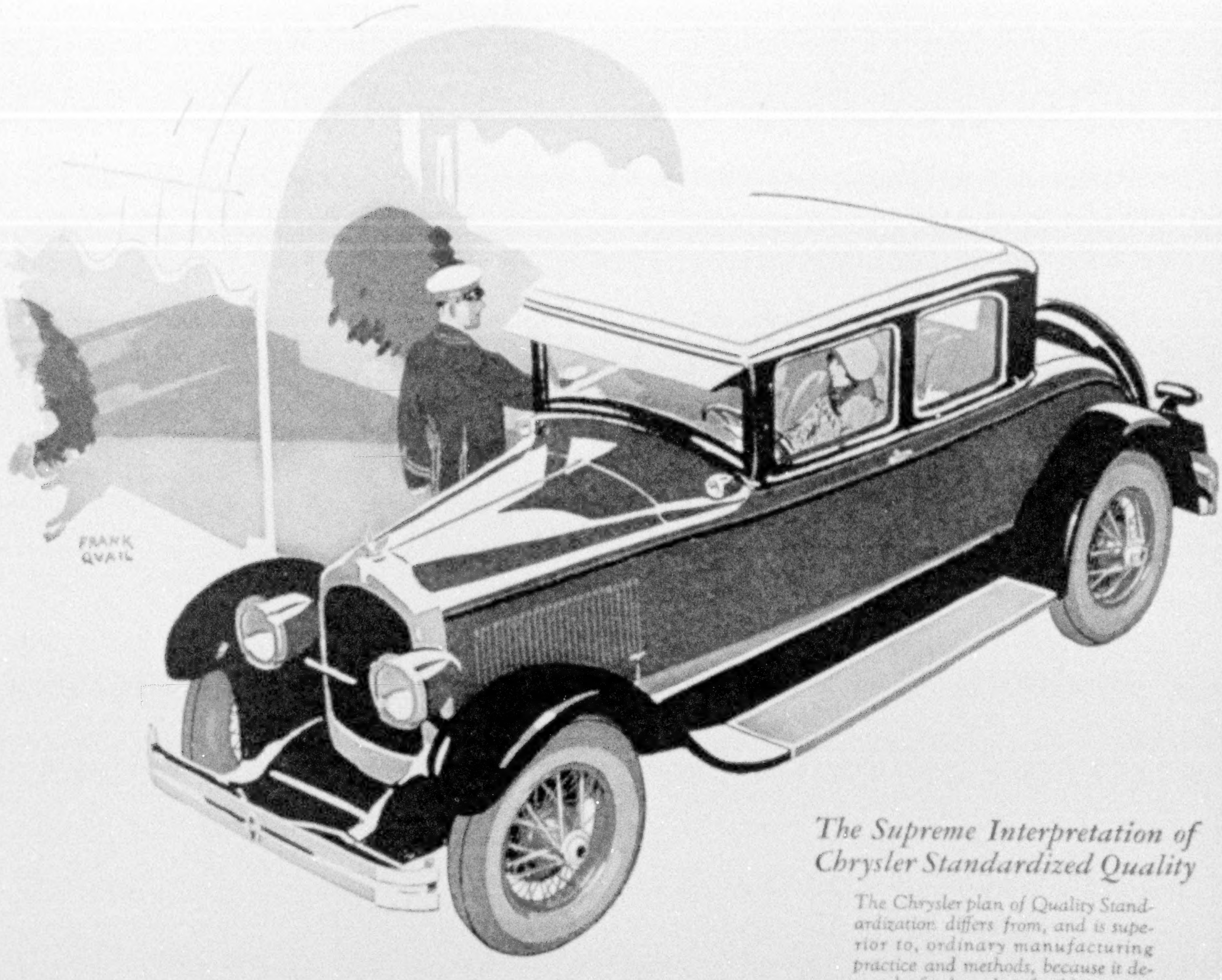

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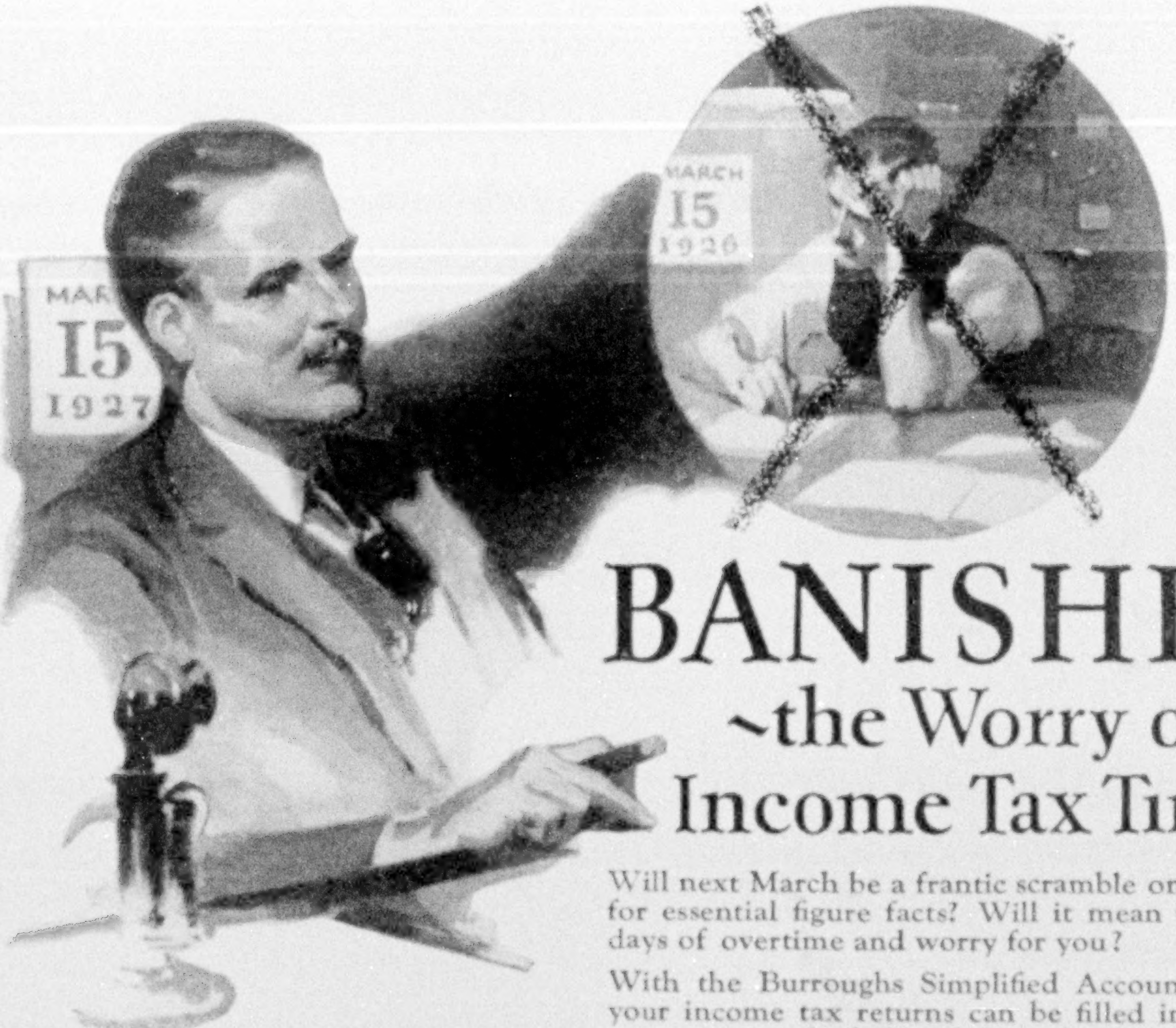

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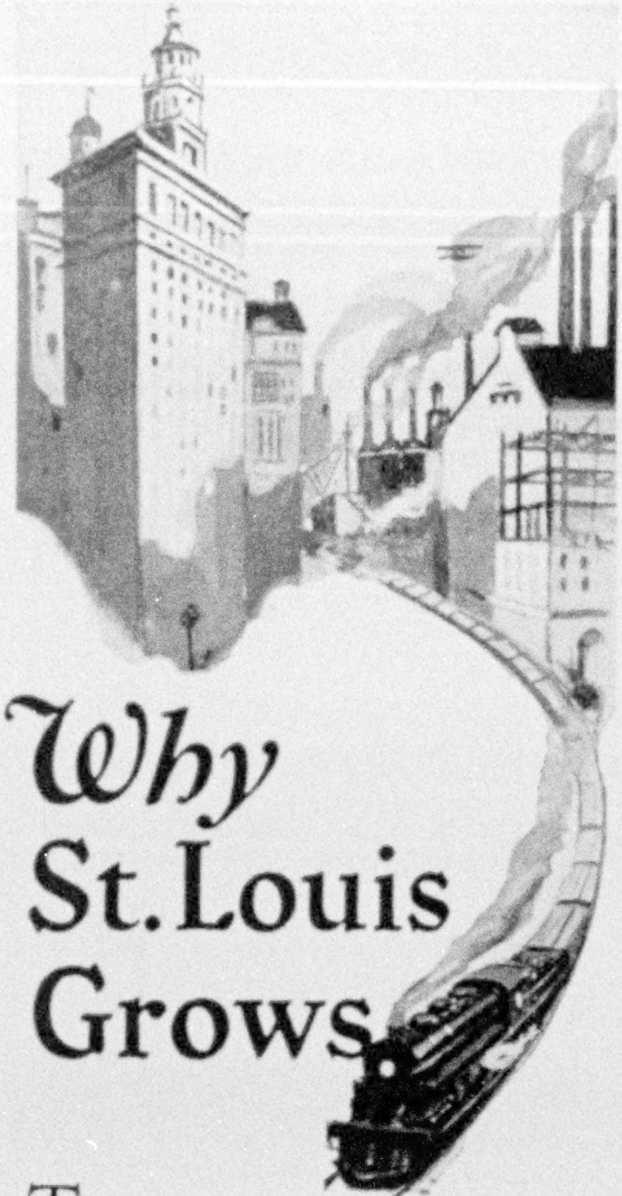

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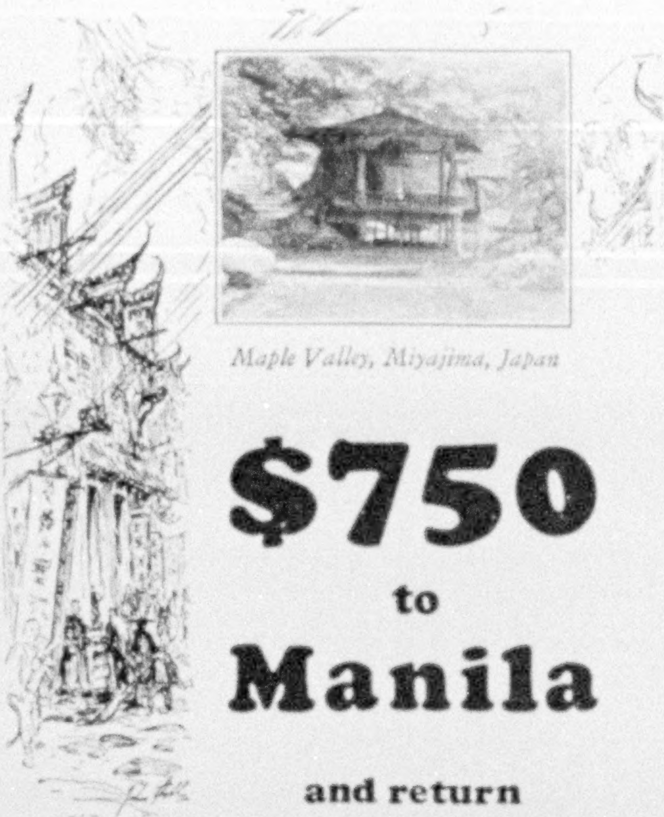

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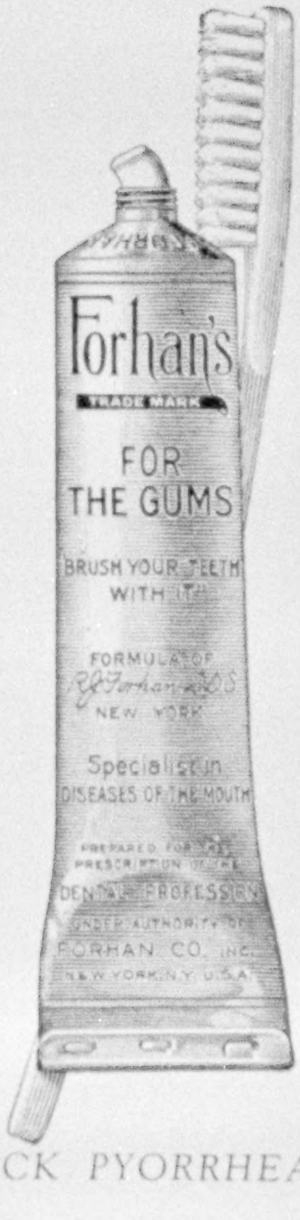

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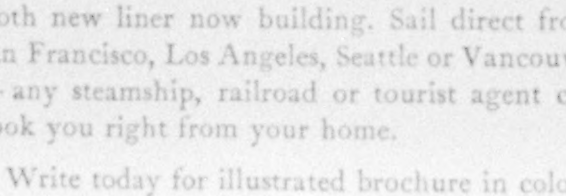

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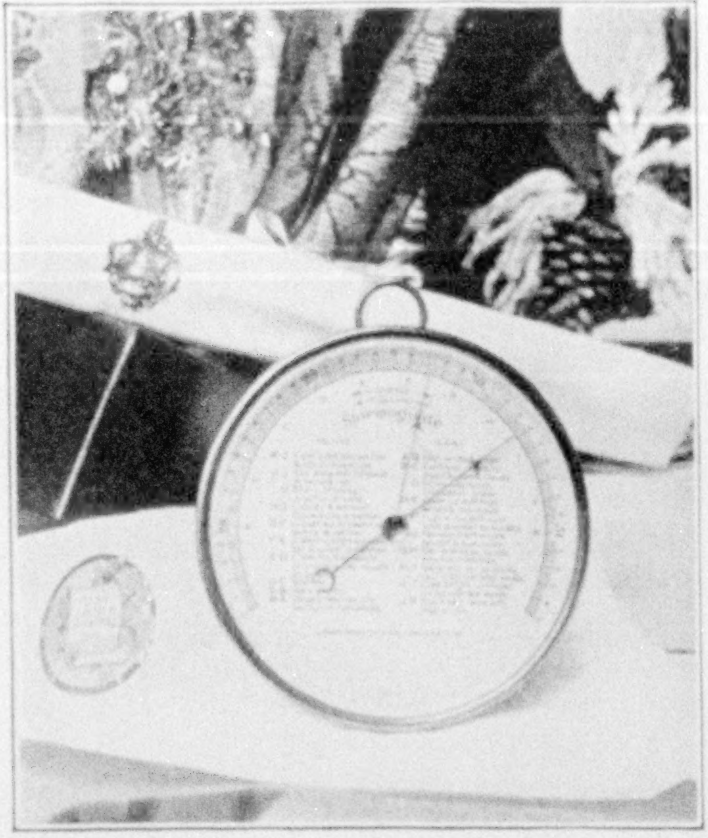

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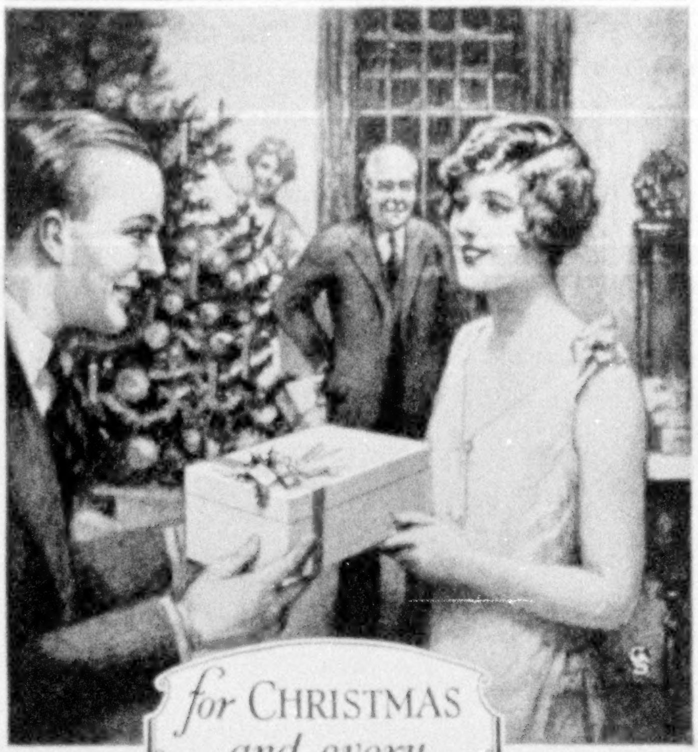

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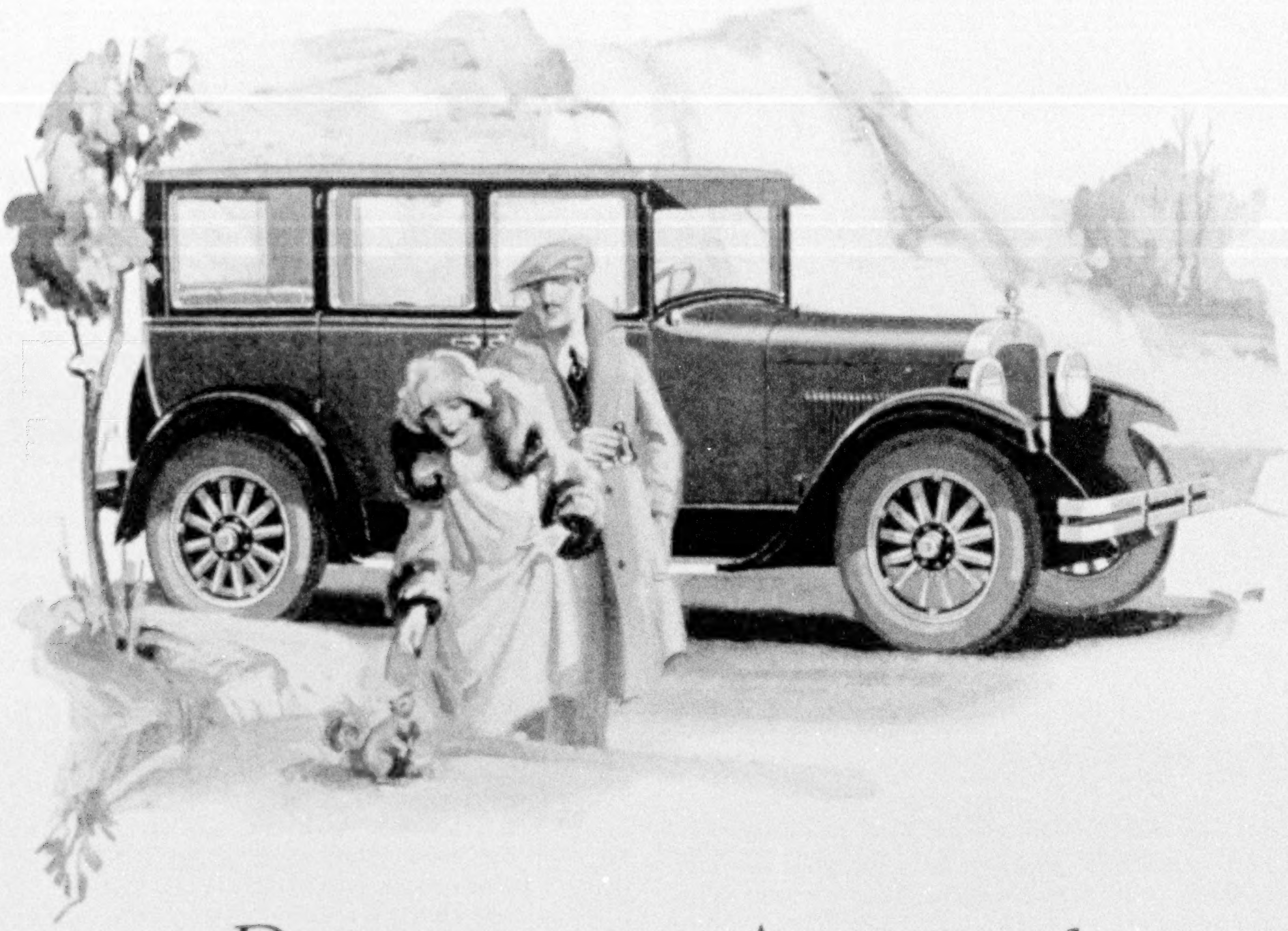

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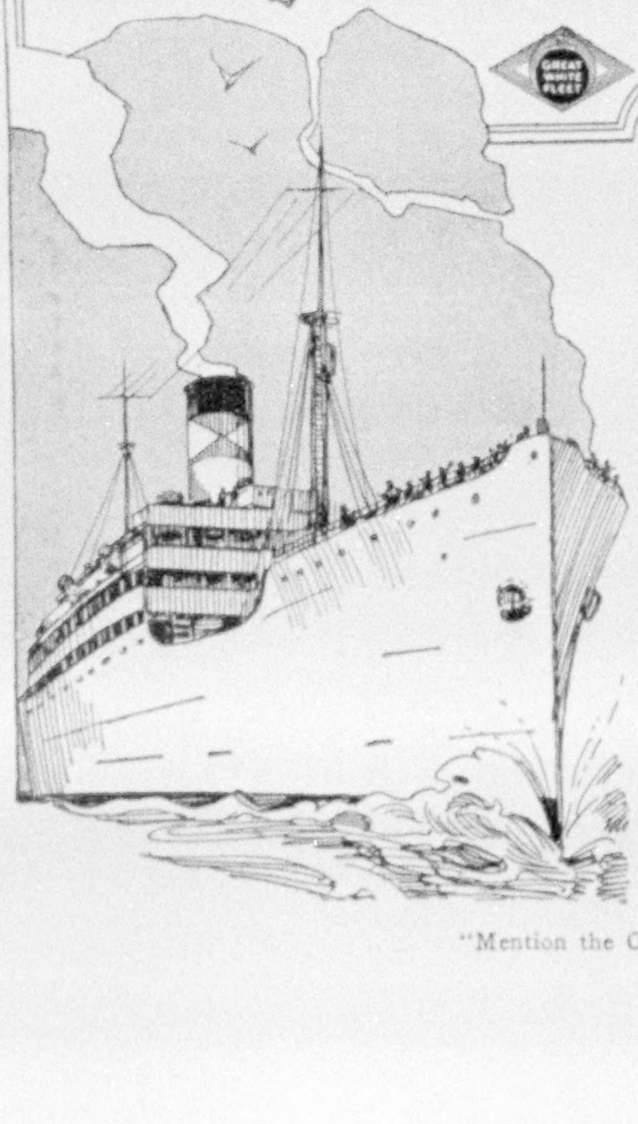

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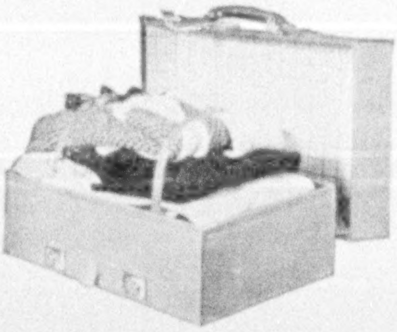

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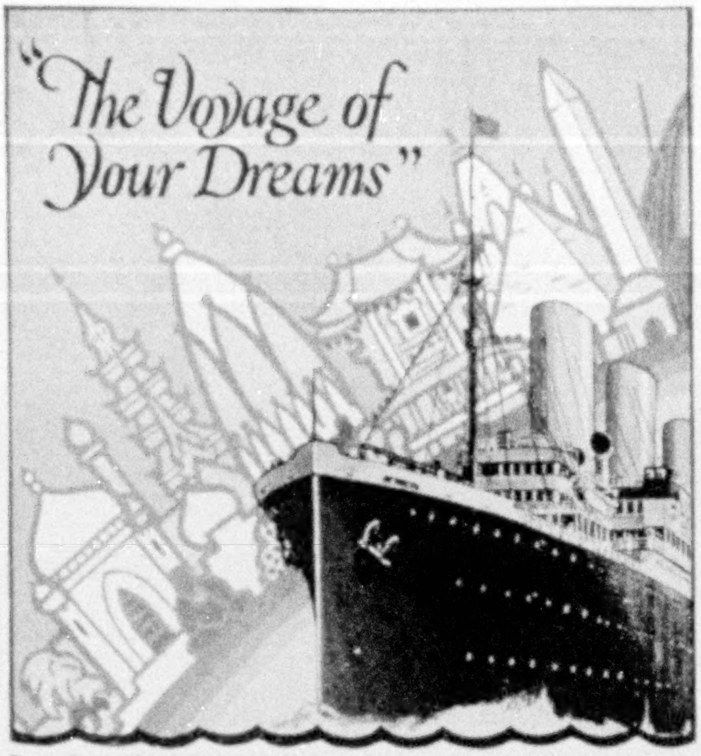

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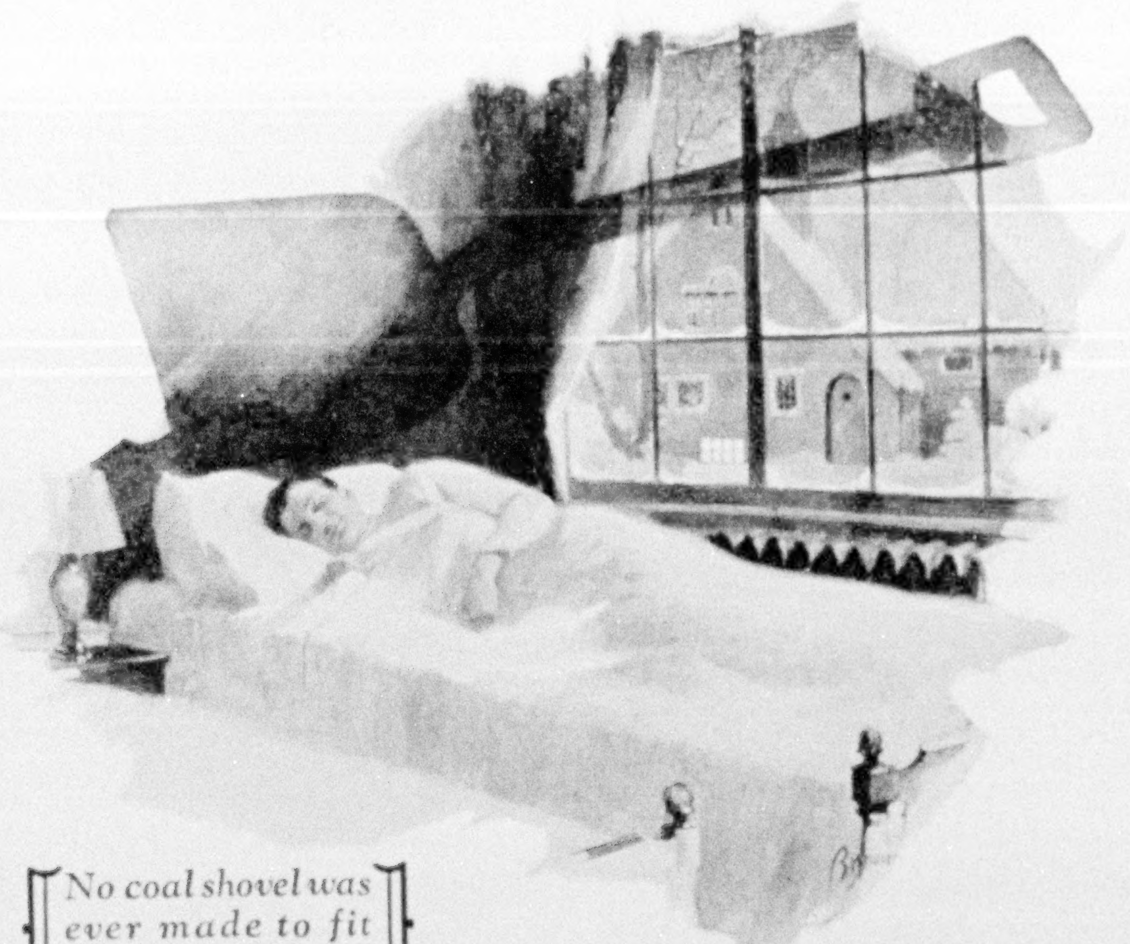

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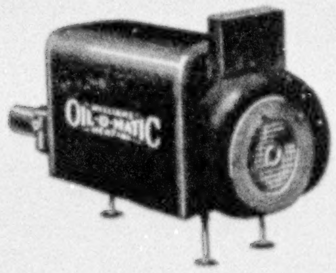

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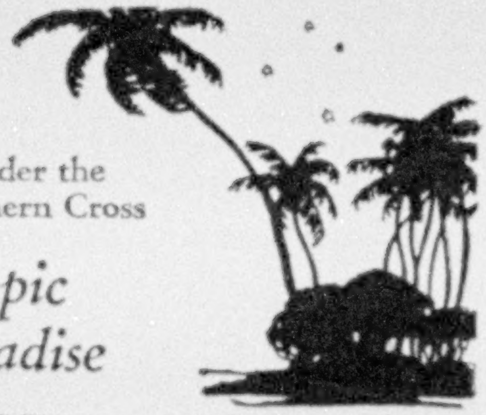

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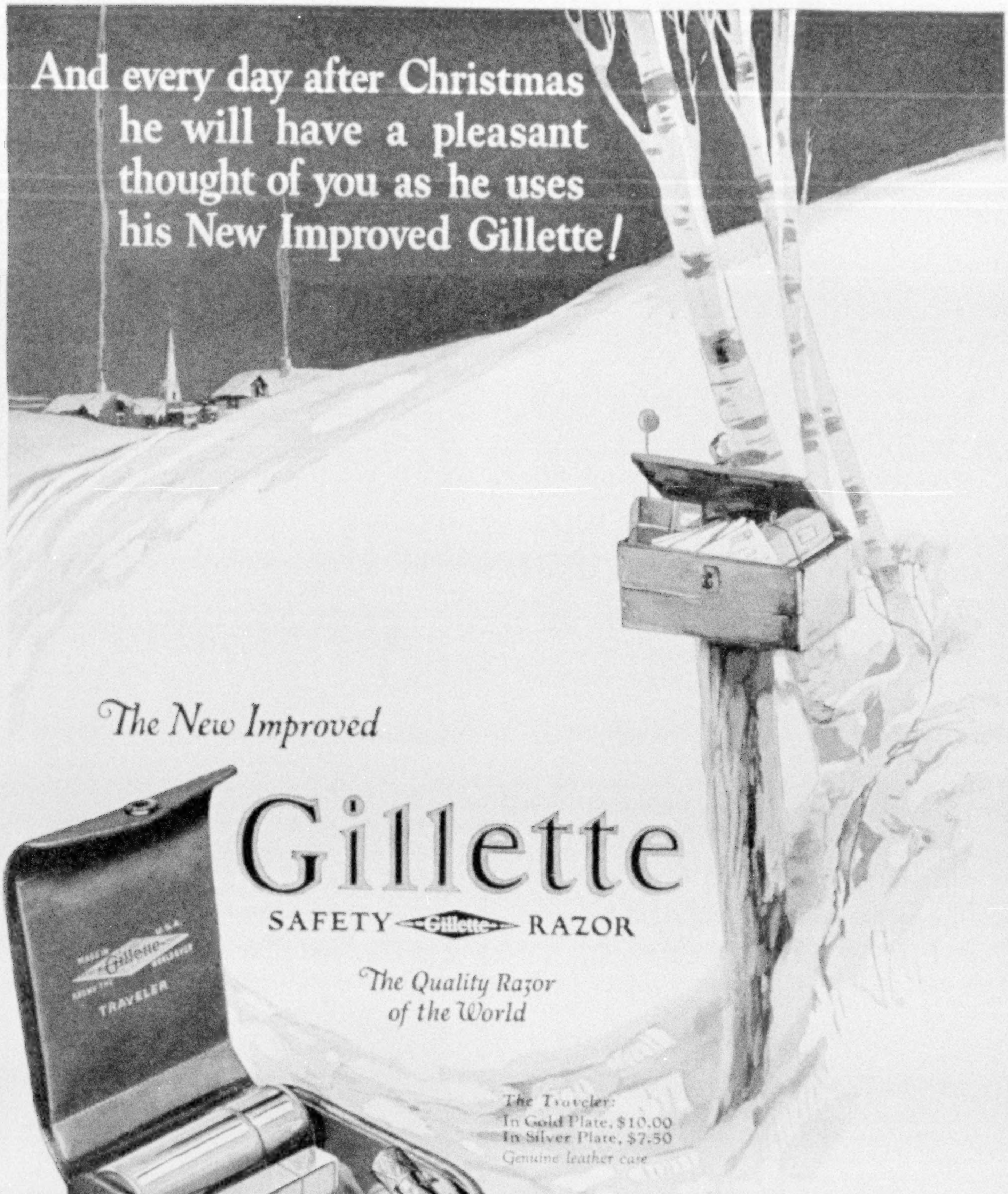

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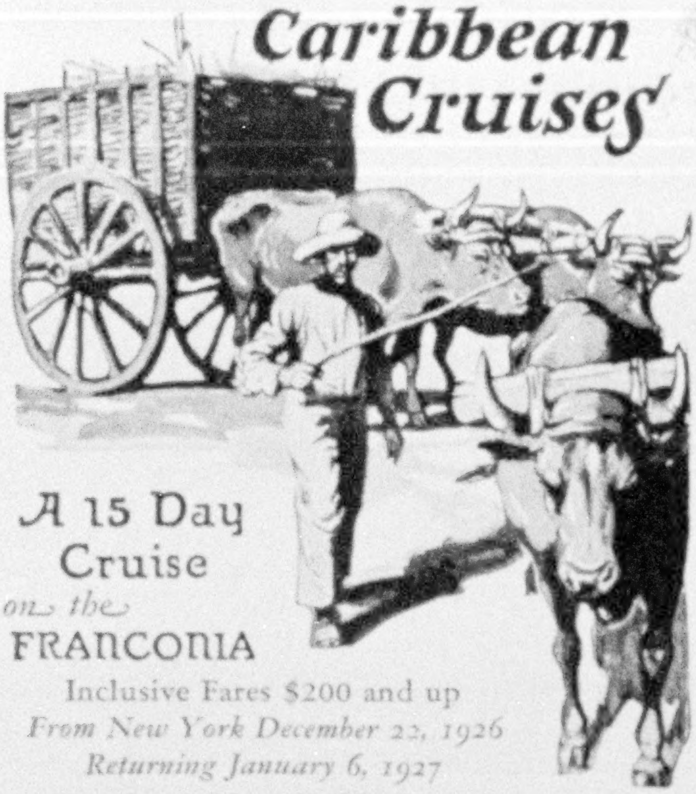

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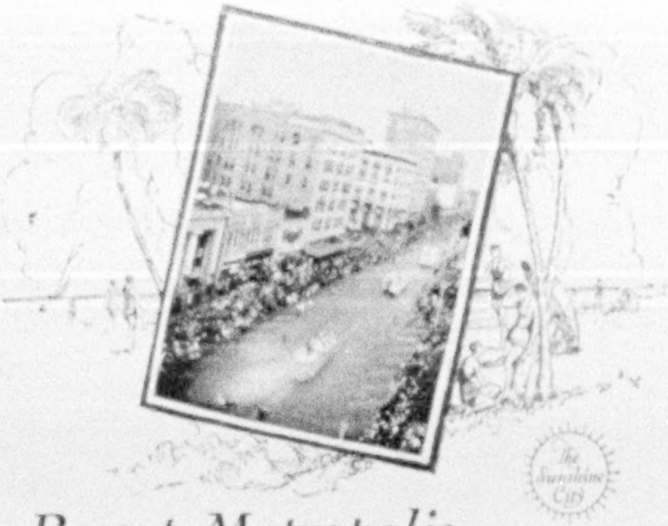

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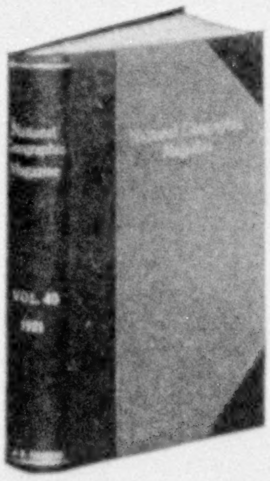

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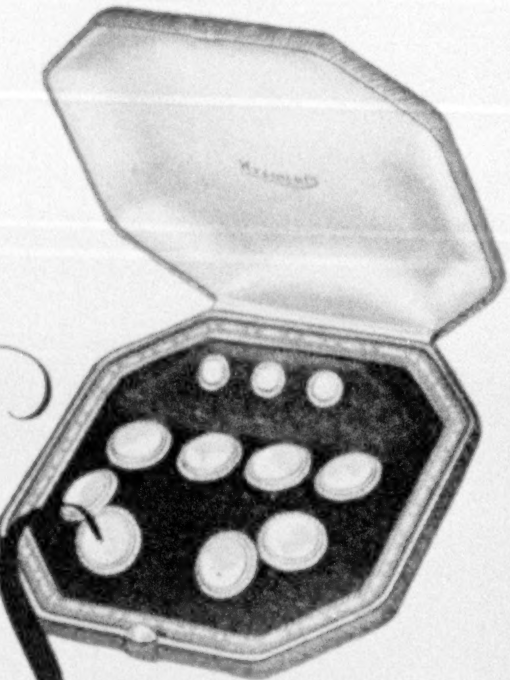

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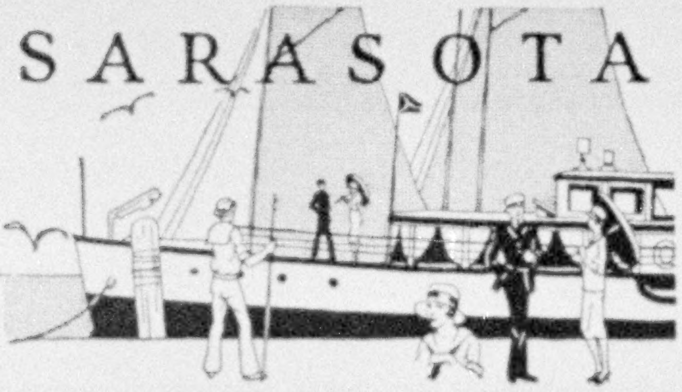

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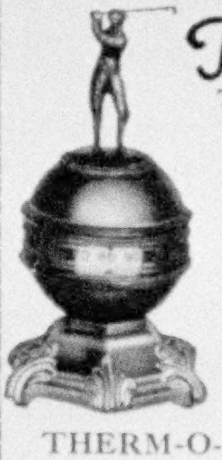

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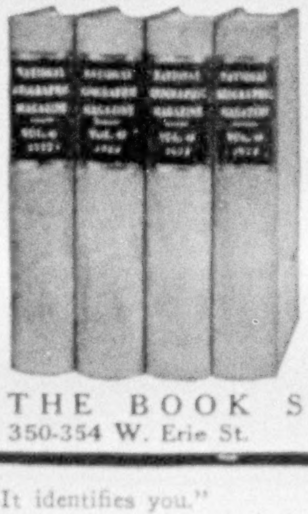

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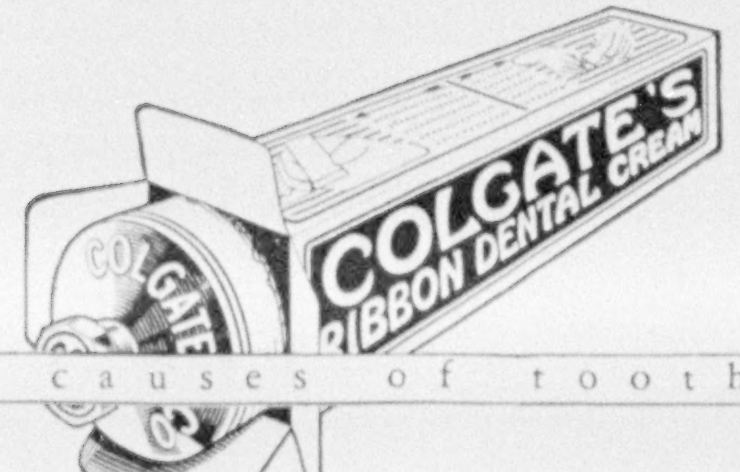

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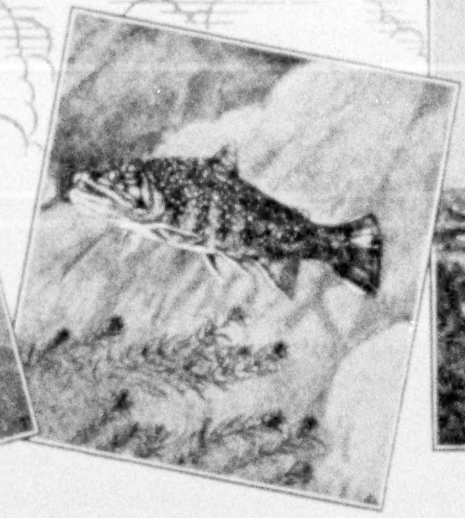
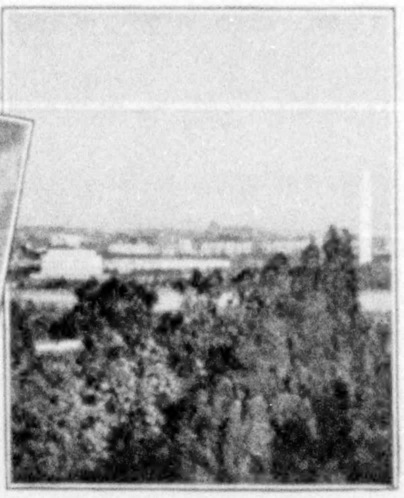

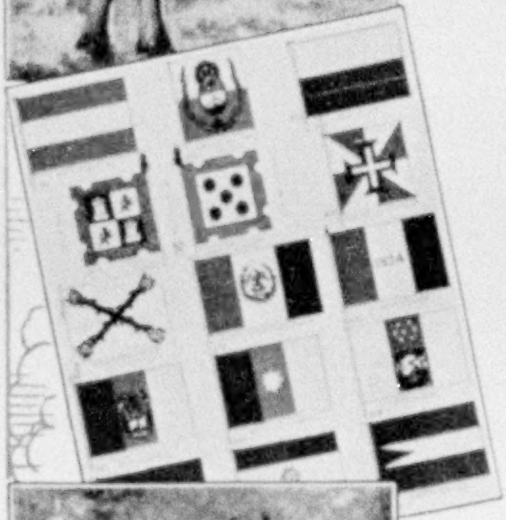

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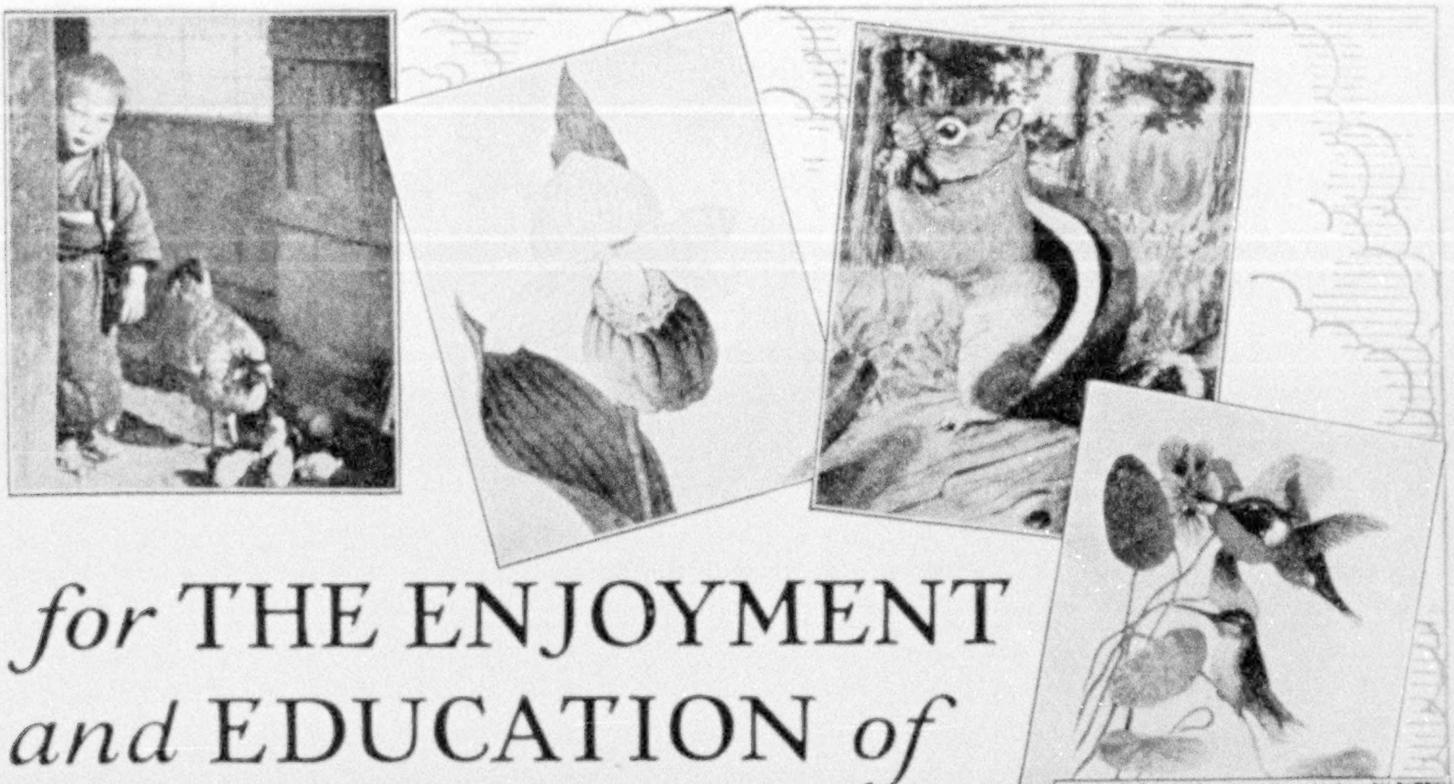

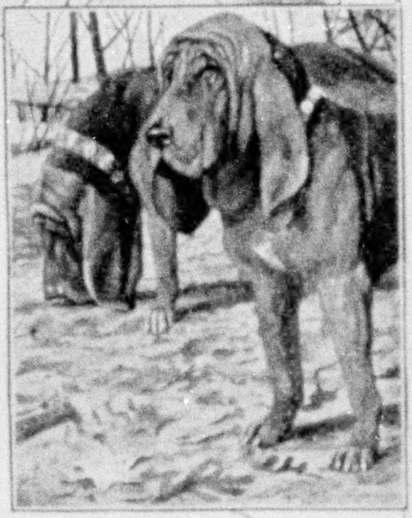

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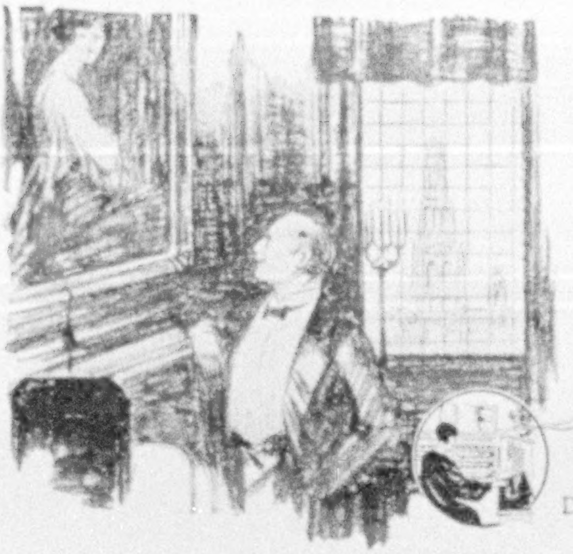

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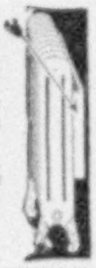

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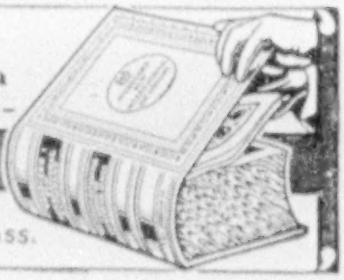

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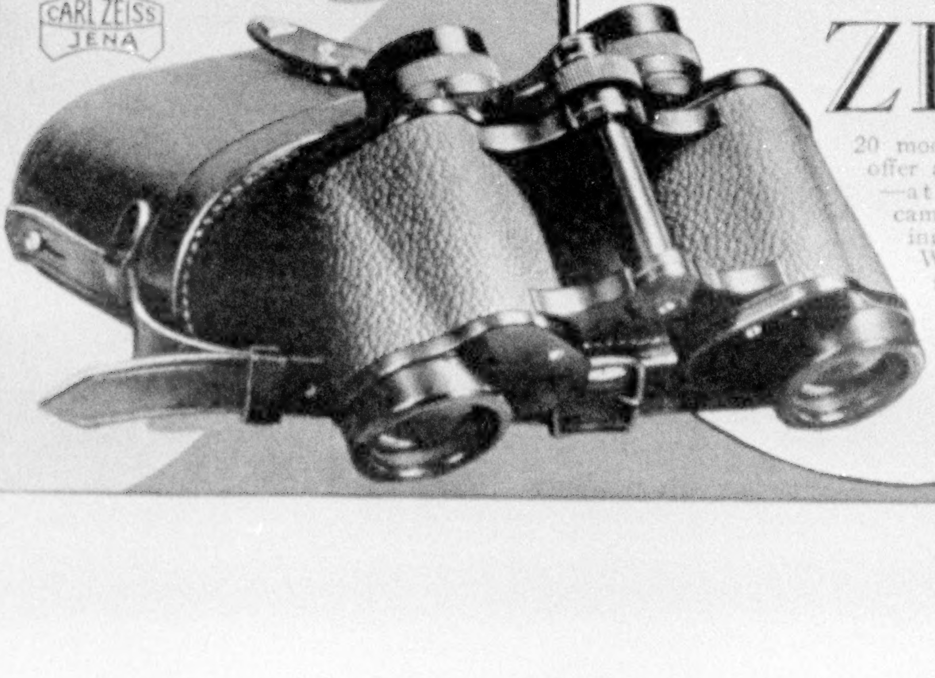

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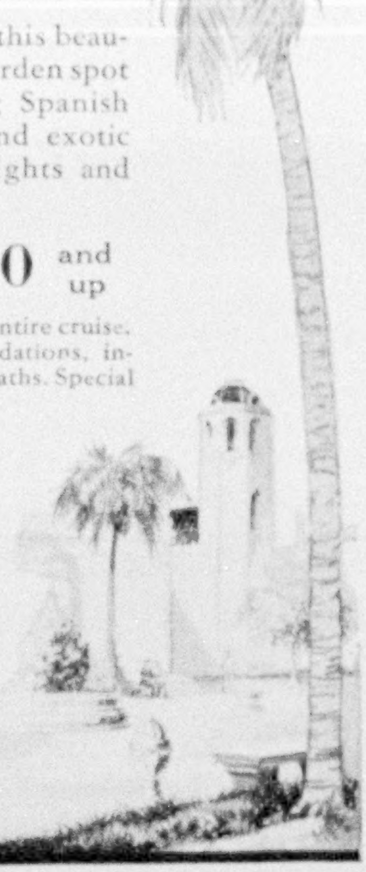

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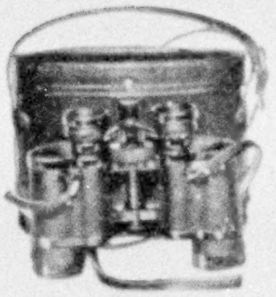

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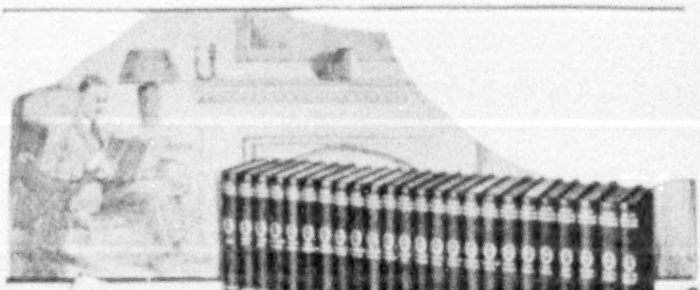

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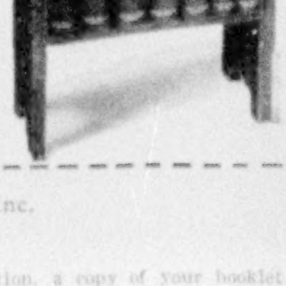

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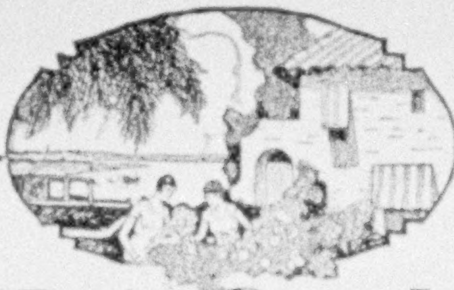

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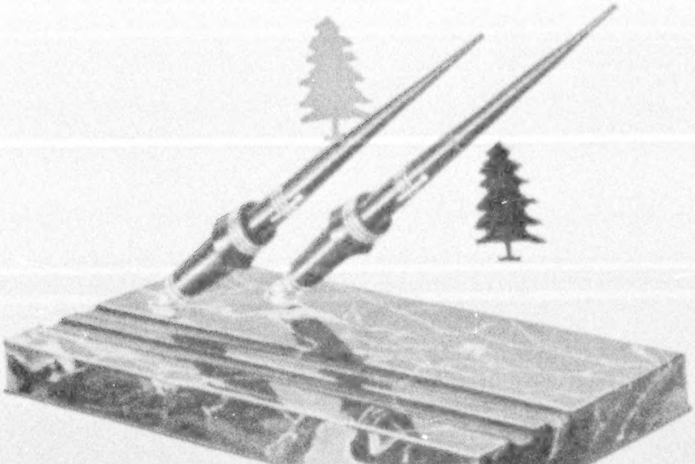

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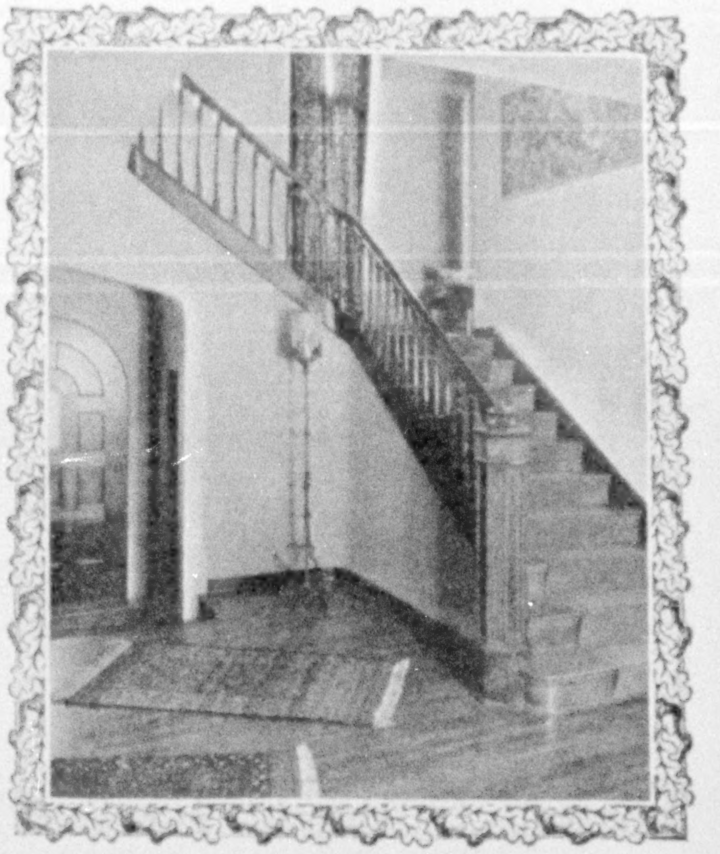

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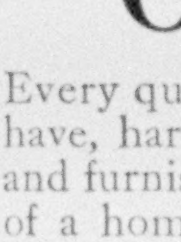

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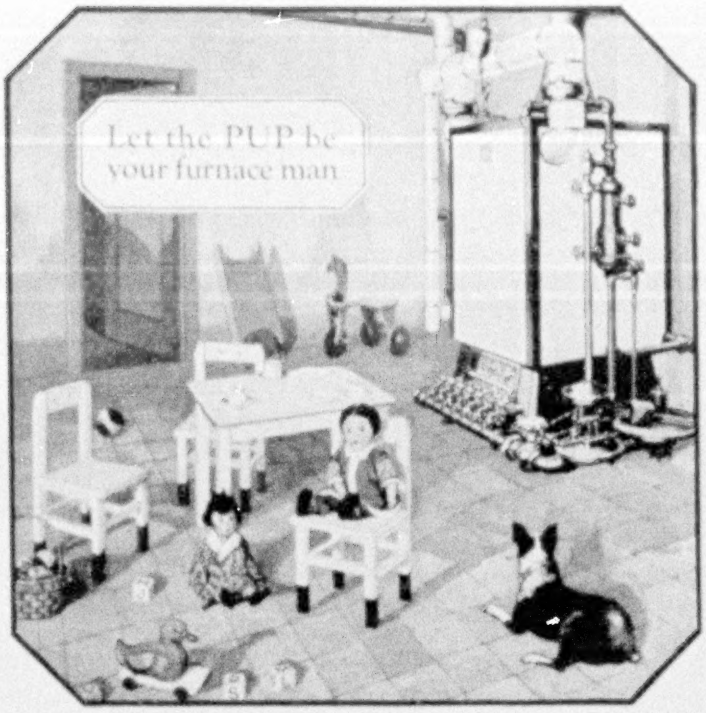

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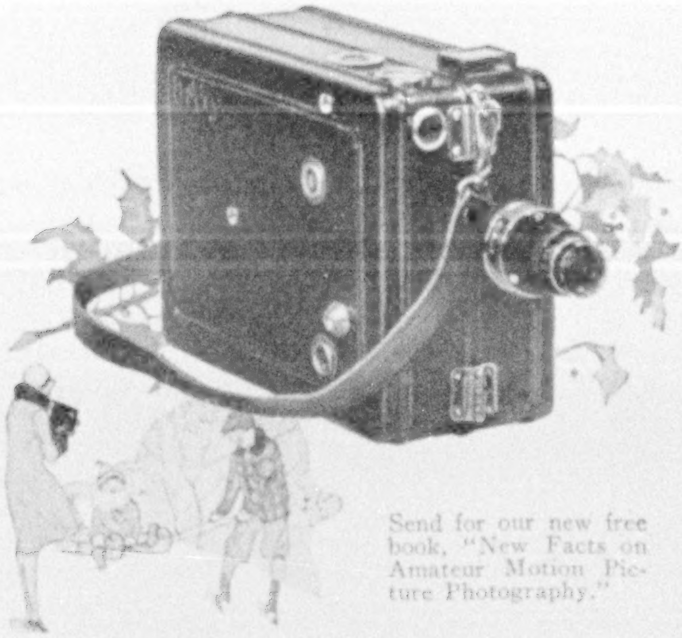

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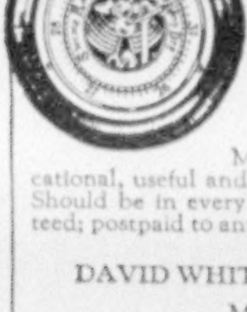

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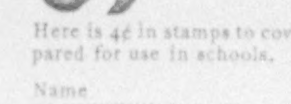

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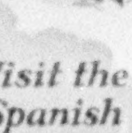

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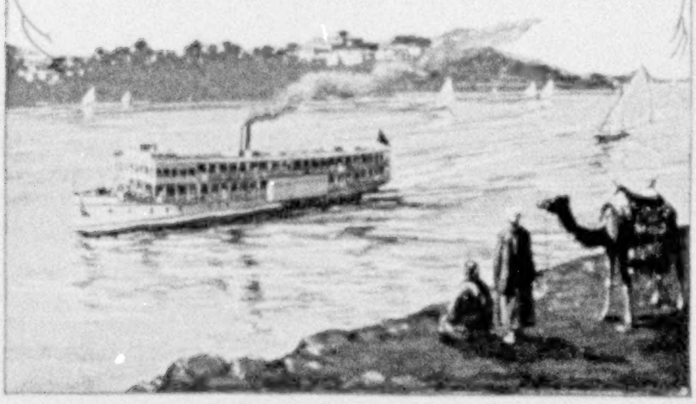

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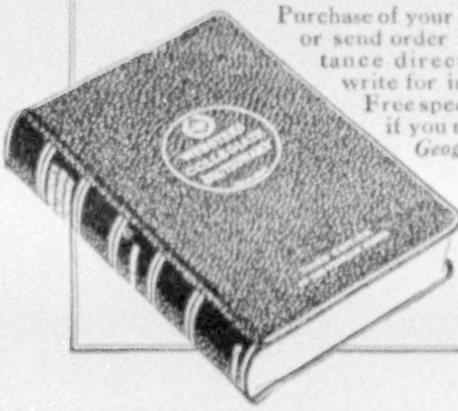

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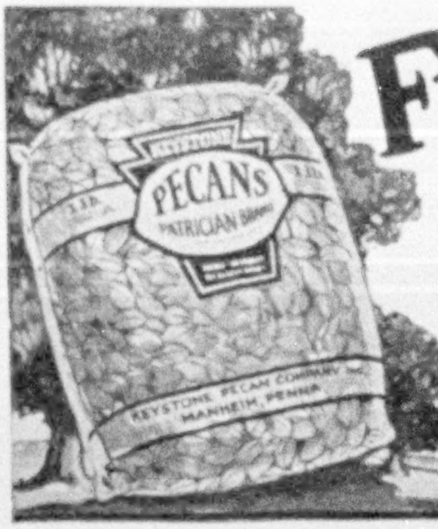

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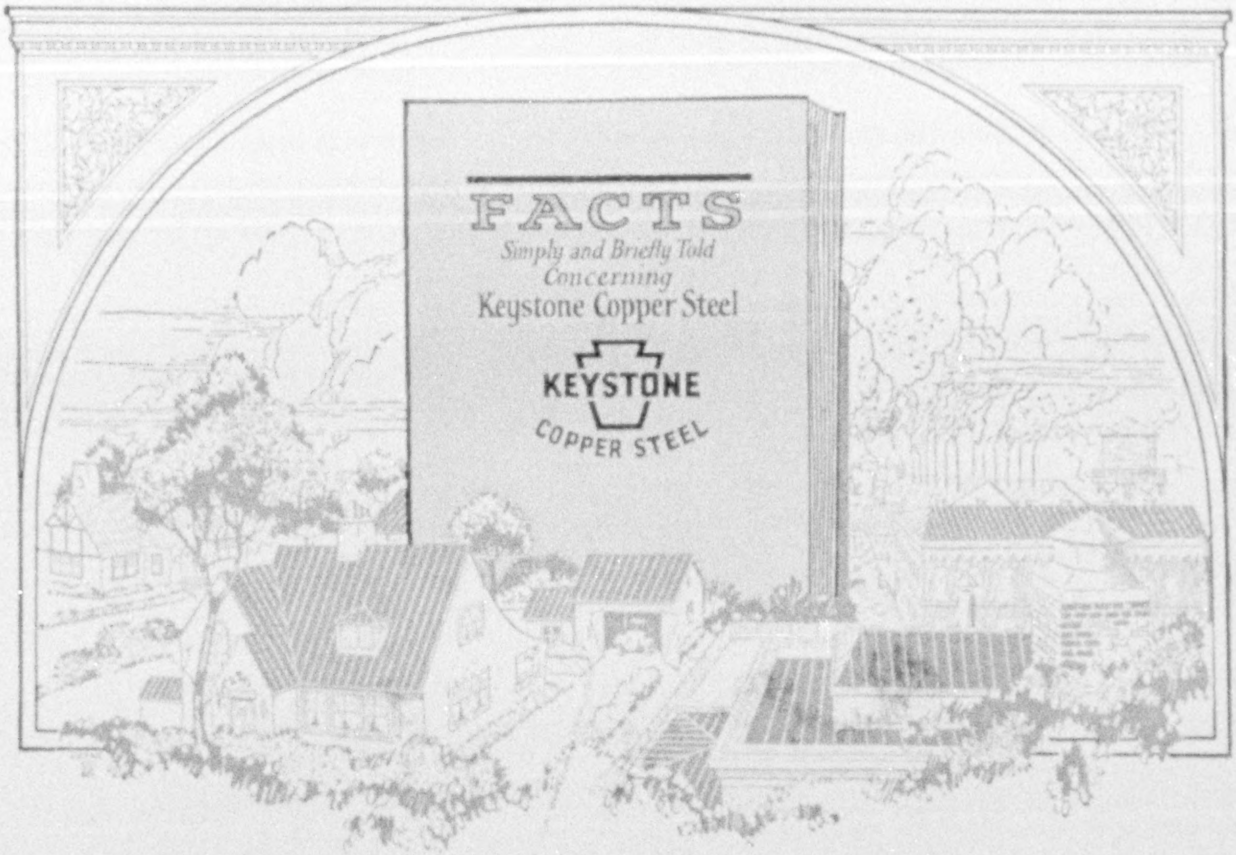

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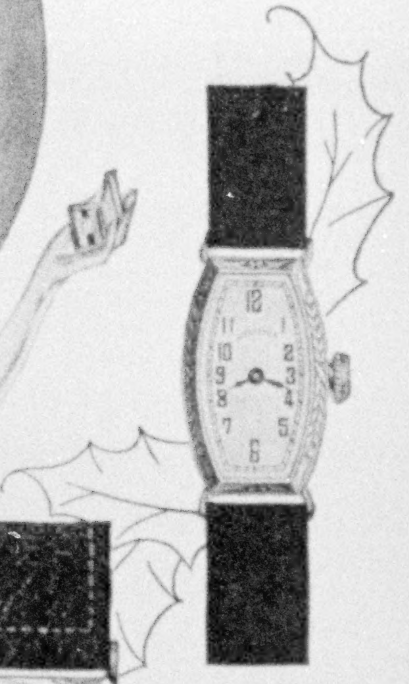

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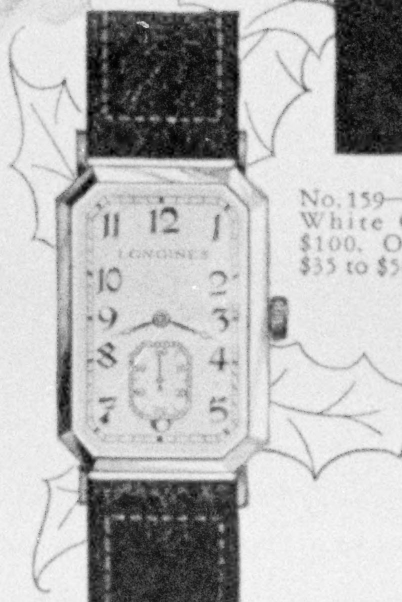

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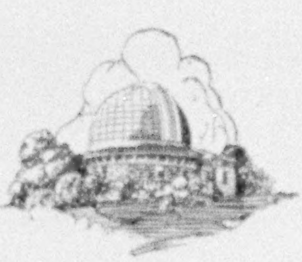

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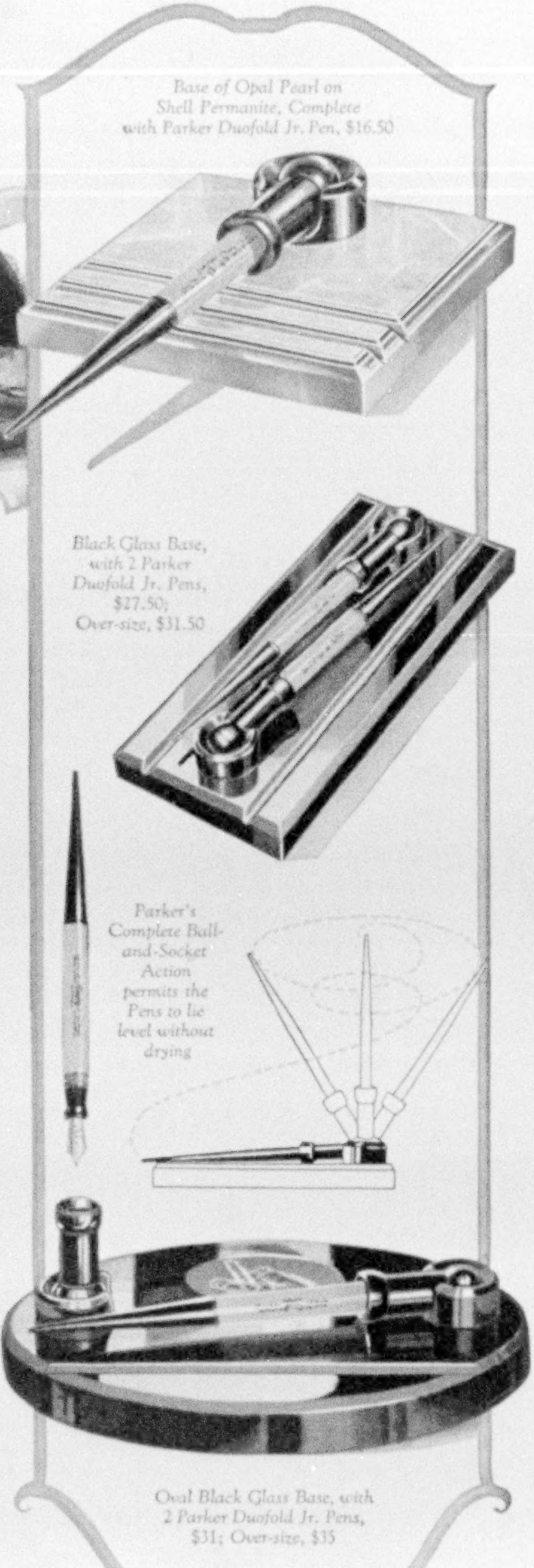
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